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ABSTRACT

The report presents findings of an examination and followup of language intervention for language delayed preschoolers. Three objectives were addressed: to develop and use a strategy for assessing the long-term outcomes resulting from language training programs, before, during, and after the transition period from special preschool programs to the public schools; to determine what communication skills are needed in public school classrooms; and to develop auxiliary procedures to teach needed language skills that can supplement available language intervention programs. Ss were studied in the special preschool and followed up in regular public school classrooms. Analyses were also conducted to determine the communication demands in elementary school classrooms, and investigations were made of milieu intervention techniques (e.g., modeling and incidental language teaching) for use as auxiliary training procedures. A major finding was that while comprehensive language training efforts resulted in significant generalization, the generalization was limited to those structures within the child's general developmental level. Students did not appear to have acquired a generalized "learning to learn" strategy. Suggestions for improved programming focus on ways to incorporate research and generalization. (Author/CL)

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Final Report

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October 1, 1979 through September 30, 1982

Bureau of Child Research

University of Kansas

TEACHING LANGUAGE FOR SUCCESSFUL TRANSITION TO THE PUBLIC SCHOOLS: A SOCIO-ECOLOGICAL APPROACH

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ABSTRACT

Successful transition from preschool programs to public school classrooms requires good communication skills. The handicapped child must have a basic knowledge of the structure and functions of language and be able to display appropriate language skills in academic settings. One means of facilitating the critical transition to public schools is to insure that the handicapped child has learned the necessary language skills to adapt to the new setting. In order to prepare developmentally delayed children for successful transition it is important to 1) know how well current language training programs work in producing generalized language in academic settings, and 2) what language skills the transition child will need to display in order to communicate successfully in the classroom.

Therefore, this research program had three objectives: 1) to develop and utilize a strategy for assessing the long-term outcomes resulting from language training programs before during, and after the period in which children make the transition from special preschool programs to public schools; 2) to determine what communication skills are needed in public school classrooms; 3) to develop auxiliary procedures to teach needed language skills that can supplement available language intervention programs.

The research population for this project included language-delayed children all of whom were initially judged to be candidates for regular public school placement if their communication handicaps could be sufficiently remediated. Each child was studied while enrolled in the Language Project Preschool, a special intervention program for preschool language-delayed children, and then followed up after they made the transition to regular public school classrooms. Studies were also conducted of elementary school classrooms to determine the communication demands in these environments, and investigations were made of milieu intervention techniques for use as auxiliary training procedures. The findings of these studies are presented throughout this report. They are organized as they relate to the three primary objectives of the project specified above. The overall implications of this program of research are discussed in the final section of the report. A summary of dissemination efforts is also included.

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I. INTRODUCTION

After many years of planning and legislation, public education for handicapped children is becoming a reality. Practical problems of implementing P.L. 94-142 remain, but major steps toward providing educational opportunities for all handicapped children have been taken. The impact of legislation mandating education for the handicapped has been felt at the preschool level and has resulted in special programs teaching prerequisite academic and daily living skills before children enter public school. While Specific curricula of such special preschool programs vary, however, most have two parallel goals: to teach skills that are immediately useful to the child, and to teach skills that will be carried over or generalized to other settings.

Language is a critical behavior for normal and developmenally delayed children, and its importance in learning and social interaction is well-documented (Blank, Rose, & Berlin, 1977). Nearly every special preschool emphasizes language learning and many employ special teaching programs and staff to insure individual language training. A large number of language training programs have been developed to teach comprehensive language skills (Fristoe, 1976), although the effectiveness of such programs in producing useful skills for the immediate environment or in providing generalized skills for subsequent use is generally untested.

The problem in language training is essentially the same one faced in all aspects of preschool curriculum. Special training is needed to ensure that atypical children will learn essential skills necessary for maximum normalization. At the heart of the problem is the need for generalized skill acquisition that will be maintained across time, persons, and settings. Generalization represents a continuum extending from the training setting to all the temporally and physically remote settings the handicapped child eventually will enter. At the near end of the continuum is generalization to situations that are similar to training, for example, generalization to a second trainer or a second training setting. In the middle range of the continuum is generalization to novel, unstructured situations occurring while the student is still enrolled in training. Although the stimulus characteristics may be different from those encountered in training, the recency of training makes generalization of learned responses only moderately difficult. The most difficult generalization is that which occurs after training has been completed, in novel circumstances. This long-term generalization or maintenance represents the child's use of learned behaviors in subsequent settings, such as the public school.

Ultimately, the effectiveness of a remedial language training program is best measured by the extent that it prepares the student to communicate effectively in nontraining environments. If the program is effective, students learn generalized communication skills that they display after training has ended and in environments far removed from the training setting.

Language is an essential behavior for success in public school. Nearly all academic skills have a language component, even the simplest skills such as color labeling, counting, and everyday living activities. The format for teaching, and thus, for learning incorporates language in almost every instance. The teacher gives instructions, asks children to perform or recite, and asks simple questions about the lessons, the child and the classroom. The sophistication and complexity of instructions, questions, and verbal interactions may vary by the age or skill level of the child, still there is a language demand in every educational setting. The successful student at any level will need to know a considerable amount about how language works.

Often, preschool programs and curricula appear to be structured without consideration of the children's future participation in other educational settings. Traditionally, language training programs have been formulated on the basis of normal syntactic or semantic development with little consideration of the linguistic and social communicative competencies needed in future academic settings. The result of the failure to fit language training to future language demands is that much of what has been trained may not be functional for the child, and thus, is not used. Generalization of previously learned language skills does not occur because there are few appropriate opportunities for the child to display these skills and the process of transition is made more difficult because the child may lack language skills that are critical for learning and interaction in the new setting.

Previously, there has been no data base describing the linguistic and social communicative competencies needed by handicapped children in public schools. Normative data tends to focus on the development of communicative competency in mother-child interactions (e.g., Bates, 1976) and does not provide sufficient description of the specific communication skills required in classrooms or consider the special problems of the handicapped child.

Most language training programs offer little data on communication needs because they have been developed either from the normal sequence of development or the authors' best guesses about what language is functional for the child. A specific assessment of the communication requirements in public school classrooms handicapped children attend is necessary to form the basis of a curriculum for teaching critical, generalizable communication skills. A curriculum designed on the basis of classroom communication requirements may simplify one aspect of the generalization problems. Typically, when generalization fails to occur, there are two possible causes: the child and the environment. The child may fail to generalize due to lack of sufficient training, or the child may be well trained yet generalization does not occur because the child's skills are not required, prompted, or supported by the natural environment. One cause of the failure to generalize might be eliminated by teaching communication skills known to be functional. With careful training, emphasizing generalization facilitation, carry-over from training to classroom is likely when skills have been selected because they are required in that setting.

There are three essential components of functional language training: 1) selection of target behaviors for training that coincide with the communication skills needed by students in nontraining settings; 2) thorough training of these skills; and 3) generalization and maintenance of trained skills to settings physically and temporally distant from the training setting. The first two components are critical training variables that influence the third component, the desired outcomes of training. It is unlikely that trained skills will generalize unless the skill is trained to mastery level with procedures designed to facilitate generalization. If the trained skills coincide with the communication demands of nontraining settings, then opportunities for using trained skills will occur and the trained responses will be reinforced by natural contingencies. The newly learned language will function to control the environment. Together, thorough training and selection of important, highly functional skills should insure generalization and maintenance of training across settings and time.

A case in point that demonstrates the interrelated aspects of training and curriculum variables is the language training student in transition from a special preschool language trianing program to a public school classroom. The student has been taught a set of skills in language training. The student's task is now to use those skills to communicate in an unfamiliar setting after training has been completed. A student's success will be determined by the specific skills taught in training, the extent to which these skills overlap with the behaviors required in the classroom, and the student's trained ability to generalize across persons, settings, and stimuli.

Generalization and maintenance of useful skills is critical to the student's overall performance in the public school because the format for learning is implicitly language based. By teaching specific skills required in the classroom in a manner that facilitates generalization, transition from preschool to elementary school can be accomplished with greater ease. Important learning time can be increased and the potential of the handicapped child more fully realized if the adaptation to the new education setting is quickly and satisfactorily accomplished.

PROJECT OBJECTIVES AND OVERVIEW

To address the problems pointed out in this introduction, three research objectives were conceptualized by our research team. Each is closely related to the others and to the overall problem as described here. They are as follows:

1. To assess the generalized effects of preschool language training on students before and during enrollment in elementary school.

This objective was focused on determining the generalized changes in students' communicative language resulting from language training during the period prior to entry into public school and after they begin attending public school. It was proposed to measure subjects' language longitudinally during the time they are enrolled in language training and preschool programs and near the end of their first year of enrollment in elementary school. Direct measurement of syntactic, lexical, and semantic generalization from training was made in addition to measures of the child's overall communication competency, thus providing a reasonably complete profile of the effects resulting from language training. Many other aspects of their communication development and limitations on it were also studied and will be reported here.

2. Observe public school classrooms in order to determine what language skills are required of students in those settings.

The academic settings that language training "graduates" entered were systematically assessed for communication demands. By assessing these settings, it was possible to propose language training that would provide the most useful skills for the child entering the public school, thus, improving the student's chances of succeeding in those settings.

3. Develop auxiliary language training procedures to teach specific communication skills typically required in school settings.

It was initially anticipated that a number of specific skills were likely to be useful in school settings. These skills are not necessarily taught by language training programs that teach primarily syntax, vocabulary, and semantics. Thus, it was necessary to develop procedures for teaching additional skills as an auxiliary program to be used with regular grammatical teaching, and to experimentally analyze these procedures.

These three research objectives were closely related and taken together represent a comprehensive analysis of the problem of teaching language for successful transition to elementary school. The remainder of this report will discuss the specific findings relevant to each of these objectives and then, in Section 3, these findings will be integrated into a general discussion and implications section. Suggestions for future research and program development will be made in that section also. Also included in this report are a summary of dissemination activities to date and all appendices referred to in the report.

A separate financial report has been prepared by the Office of Research Administration at the University of Kansas and is not included with this report. It will be sent under separate cover to the appropriate budgets and contracts officials.

II. RESEARCH SUMMARY

OBJECTIVE 1: To assess the generalized effects of preschool language training on students before and during enrollment in elementary school.

This objective involves the longitudinal measurement of language generalization in a child's natural environments during the time the child is enrolled in a preschool treatment program and then during a follow-up period after the child has entered elementary school. In many respects this research forms the backbone of all our efforts. It has been made possible through the development of a sophisticated computer analysis system for dealing with large amounts of naturalistic child language data. Through this research we have determined several constraints on natural language generalization and the specific characteristics of these constraints. We have also identified which aspects of traditional one-to-one language therapy are functional and which are not. The follow-up component of this research has suggested that language delayed children tend to "plateau" in terms of their linguistic development when they enter elementary school after typically making substantial progress during preschool intervention. This effect has led us to consider ways to better prepare these children for the realities of public school classrooms.

In this section we will report results on six sub-components of this objective. Taken together the research reported in these components represents a thorough analysis of the questions posed in Objective 1. These sub-components are: 1) individual subject and group analyses of longitudinal language generalization; 2) a group analysis of the effects of high and low rates of speech usage on the distribution of pragmatic functions; 3) a group analysis of the effects of form complexity (length of morphemes) on function usage by students; 4) the public school transition follow-up; 5) a theoretical model resulting from this research (and other efforts) for relating form and function to the generalization of language. Results for each of these components are presented below. First, the general methods utilized in this research are presented.

General Methods

a. Subjects and settings. All basic longitudinal generalization research was conducted at the Language Project Preschool and all transition and follow-up research was conducted in public school kindergartens in Lawrence or surrounding communities. The Language Project Preschool is a facility of the Bureau of Child Research at the University of Kansas. The preschool annually serves 10-12 language delayed preschool children with mild to moderate language delays (6 months-2 years below age level). The children participate in a regular half-day preschool curriculum, and receive daily language training during 20-minute sessions with a speech clinician. Children are usually enrolled for 1 to 2 years, and at about 5 years of age make the transition to elementary school.

b. Language training. Each subject received systematic language training on the Stremel-Waryas language training program. The general format and initial generalization procedures of this program are discussed below. It is currently available commercially from Teaching Resources.

Following program-specific assessment, a child beginning on the Stremel-Waryas training program is placed at the specific step of the program that most closely resembles the child's language abilities. Once training commences, the child meets daily with a language trainer for 15-30 minutes. Training is carried out either one-to-one or in a small group of children receiving similar training. The program utilizes modeling, imitation, and differential reinforcement to teach the content of each step. Children move through the program by reaching criterion on each step. The initial criteria requirement is that the child demonstrate at least 80-90% success on a series of trials over a given training item during two consecutive sessions. The child's abilities to generalize within the training setting to a second trainer, across similar stimuli, and across similar structured settings is then probed. The child must display these forms of probe generalization before moving on to the next step of the program. If the child does not generalize across these simple dimensions, there is no reason to expect generalization to the more complex natural environment. If the child scores less than 70% on any generalization probe, specific training for that dimension of generalization is instituted. When the child reaches training criterion on the trained generalization items, he is again tested with new examples, a new trainer or in a new setting. Training continues until the child is successful on all generalization probes for a specific training step. The sequence for generalization probes and training is shown in Figure 1. As the child progresses through the training steps, reliability is assessed to determine if the trainer is following the training procedures appropriately, and to determine if the child's performance in training is being recorded correctly by the trainer. The use of within-setting probes and reliability measurements assures that the program is applied systematically and thoroughly within and across subjects.

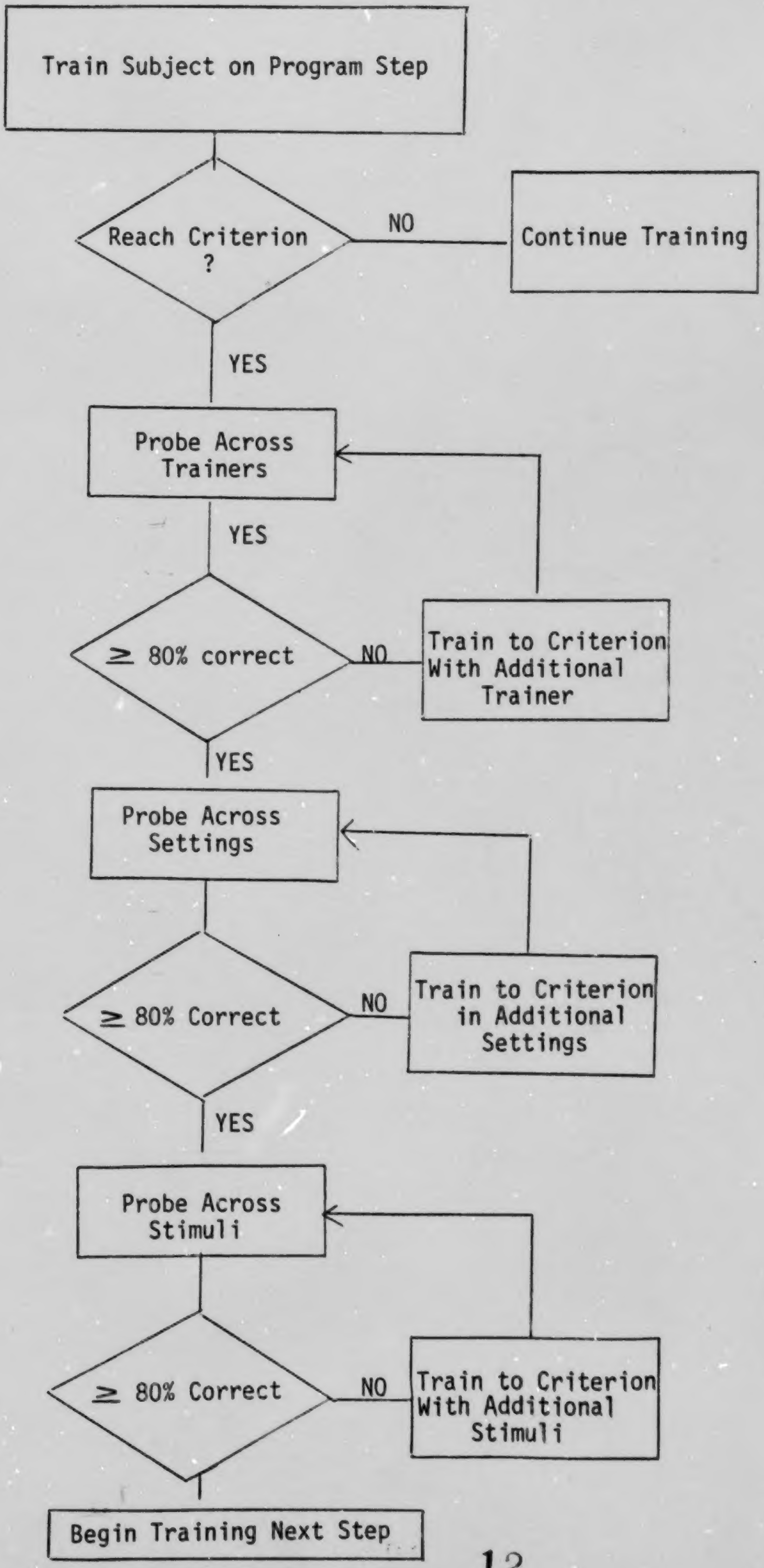
Insert Figure 1 about here

c. Data collection procedures. Throughout this research project, verbatim samples of subjects' language and contextual information were collected in exactly the same manner. Data collection procedures are described below. Additional information about other data collection is contained in other specific sections of this report.

Verbatim samples: Verbatim samples of subjects' speech were recorded by a trained observer during a 15-minute observation period. During each observation, a tape-recording of the subject's language was obtained by having the subject wear an apron containing a small

Figure 1

Probe Procedures



wireless microphone (i.e., an FM telemetry system). The subject's speech was transmitted to a receiver and tape recorder located in an adjacent room. After the observation was over, the observer used the tape-recorded sample to supplement and correct the record made *in vivo*. The observer checked all *in vivo* coding and did additional coding as necessary. The sample was then prepared for computer entry, entered into the subject's data file, and analyzed.

Contextual and functional information: Concurrent with the recording and transcription of verbatim samples, a trained observer coded each utterance to indicate the purpose it served in a communication interaction (e.g., interactional, affirmative, verbal play, self-regulation, imitation, request, etc.). The correctness (as determined by appropriate lexicon) and appropriateness of the utterance to the ongoing interaction was coded. The observer also indicated if the utterance was directed to a peer or teacher, and if there was an obvious verbal prompt for the utterance (e.g., a question to the subject).

Complete copies of observational codes for verbatim and contextual data collection are included in Appendix 2.

d. *Reliability*. Rigorous reliability assessments in experimental research are necessary to insure validity and replicability of procedures and results. Reliability has been carefully assessed in most experimental analyses of generalization, however, reliability of verbatim transcription and coding in psycholinguistic research is seldom assessed (Dale, 1978). Developmental psycholinguistics is a relatively youthful scientific discipline. Nevertheless, many of its findings may be suspect because little attention has been given to observational reliability and across-subject replicability. With this in mind, careful attention will be paid to issues of reliability in the proposed research.

The recording and coding of verbatim language samples necessitated thorough reliability assessments. The high quality of the recorded sample, in combination with the observer's record, typically provided highly reliable data (averaging about 90%). Reliablity was assessed once in every five observations by having two observers simultaneously prepare verbatim transcripts of the subject's utterances; these transcripts were compared morpheme by morpheme for agreement. Observers also coded the function of utterances and the environmental support available for each utterance. In these instances, reliability of coding also was computed by comparing each categorization of the utterance for agreement. Data collected in an observation for which the reliability score was less than 80% was not used. Reliability in all instances was calculated using the formula:

$$\frac{\text{Number of agreements}}{\text{Number of agreements + number of disagreements}} \text{ X } 100 = \text{\% reliability}$$

Overall reliability on verbatim and contextual coding across 230 reliability observations spanning the length of the project was 90% and ranged from 46% to 100%.

The reliability of all behavioral codes and observational procedures used in other aspects of this research was similarly evaluated.

e. Computer analysis. The complexity and massiveness of the longitudinal natural language samples gathered required that a sophisticated computer analysis system be developed and utilized. Two types of information were entered into this system: 1) a list of syntactic structures that a given subject was trained on during the course of the study and the date on which training commenced; 2) all the verbatim speech samples taken on the subject in chronological order. Prior to entry each verbatim sample was reviewed and all instances of entirely unintelligible utterances, recitations, singing, noise words (e.g., oh, ugh), and counting were removed from the transcript. In addition, certain nonstandard forms were converted to their standard forms (e.g., yeah to yes; nope to no, etc.). The computer program was designed to do the following functions:

a. assign part-of-speech categories to all words;
b. keep track of all words found in a child's language samples;
c. keep track of all the examples of trained phrases found in the samples;
d. keep track of all the words and sentence patterns taught in language training to the child;
e. find all the trained words and sentence patterns that occurred in the language samples (generalization to the natural setting);
f. calculate MLU (mean length of utterance) and Upperbound (longest utterance) scores for each sample;
g. print a summary of all these findings.

The key to the operation of the program was a two-part interactive system designed to attach a syntactic descriptor to each word used by a given child. One part, the system dictionary, consisted of several hundred words commonly used by individuals with linguistic skills associated with an MLU of 1.0 to 4.0. Each word had a part of speech associated with it. For example, ball - noun, eat - verb, blue - color adjective, he - 2nd person pronoun, etc. Each child also had his or her own dictionary made up of words used by that child and not found in the system dictionary. Using these two dictionaries the computer coded each utterance as a syntactic string (e.g., "I want that" = 1st Person Pronoun - State Verb - Demonstrative Pronoun; "Throw me the ball" = Verb - 1st Person Pronoun - Article - Noun) as the operator entered it. Each time the computer came across a new word not in its dictionary system it would ask the operator "What is the part of speech of the word "funky" in "You funky guy," and the operator would type in the appropriate designation, in this example, "Adjective".

Some words can be used in different ways and therefore cannot always be tagged as the same part of speech. For example, "run" can be used as both a noun (as in "We went for a run") and a verb (as in "Let's run"). For a large set of words often used in various ways, the computer was programmed to always ask the operator to assign the appropriate part of speech. For words used in multiple or unusual ways only by a given subject, the operator would specifically assign the appropriate part of speech as she was entering the term. In cases where a word was used in a particularly odd or unexpected way, the observer who recorded it would assign the appropriate part of speech designation and include it on the written transcript. In the few cases where no one could confidently assign a part of speech, the entire utterance was discarded.

The same individual entered all the data collected and analyzed throughout the entire study. She did not personally know any of the subjects involved nor have more than a general understanding of the project. However, she had a good working knowledge of syntax and quickly developed a keen appreciation of the usage patterns typically manifested by each child.

Once all the child's training and verbatim data had been entered and each utterance had been coded as a syntactic string, a routine was executed that compared each utterance pattern with the patterns trained or to be trained. Two summaries of structure generalization, first occurrence (novel examples of a trained pattern) and frequency (total number of instances) of usage of the trained pattern were computed for each verbatim sample as well as MLU and Upperbound. The computer analysis system is overviewed in Table 1. This system generated

Insert Table 1 about here

the first level of data analysis on which further analyses discussed in this section are based.

Individual Subject and Group Longitudinal Analyses of Language Generalization

During the past 15 years many comprehensive language training programs have been developed and disseminated. These programs are widely used in the treatment of all types of language deficits and delays. Although a great deal of research has been conducted utilizing probe strategies to assess generalization of specific language skills along some limited dimensions, little has been shown about the generalized effects of language training on the child's actual language use in the real world outside the lab or training room. Many types of effects are possible including syntactic and semantic, pragmatic, rate, and general developmental. However, as part of this research program we have investigated the generalized effects of comprehensive language training on the structural aspects of eight language-delayed preschool children's productive speech. In contrast to most previous research on language generalization, this investigation was conducted by analyzing speech samples of the children in everyday classroom conversations.

The eight preschool children in the study displayed developmental language delays ranging from 6 to 18 months. Six came from low SES backgrounds. All attended a special preschool program for language-delayed children where they were involved in the present analysis for

Table 1

Language Generalization Computer Program

Syntax Analysis Routine

PROCEDURE	EXPLANATION
1. Read each utterance	Utterances in sample are read sequentially
2. Segment main clause(s)	Removes vocatives (names and attentional words) and interactionals (e.g., please)
3. Assign syntax notation	Each word was previously assigned a part of speech in the word analysis stage. Parts of speech are recalled from the sentence record and printed in sequence to produce a syntactic string
4. Compare syntactic pattern of utterance with training patterns	Program searches the list of trained syntax forms and indicates if the utterance matches a training form
5. Determine if form is novel	Program compares current utterance with all previous examples of the same syntactic form and indicates if the utterance is an old or new example of that form
6. Enter example into subject's clause dictionary	If the example is novel, it is entered into the list of examples of the form used by the subject. Tallies of old and new examples of each grammatical form are kept
7. Repeat until all utterances are analyzed	
8. Print out summary of data	

EXAMPLES

SAMPLES

Nancy, I get cookie
Want cookie, please

CLAUSES

Clause	Syntactic Form	New/ Old	Trained	# Occur
I get cookie	Pro V N	New	No	1
Want cookie	V N	Old	Yes	2

TRAINED FORMS

Syntactic Form	Examples
N V	Boy eat Dog run
Pro V N	I want car

CLAUSE DICTIONARY

Clause	Syntactic Form	First Date	Last Date	# Occur
I want ball	Pro V N	9/18/78	9/18/78	1
Boy sit	N V	9/20/78	9/20/78	2
I get cookie	Pro V N	9/27/78	9/27/78	1

CLAUSES FOUND IN SAMPLE

Date: 9/27/78
Setting: LPP

PRO V N

Clause	New/Old	Trained?	# Occur
I get cookie	New	Partial	1
I want car	Old	Identical	2

periods ranging from 8 months to 2 years. While enrolled in the preschool each child received 20 minutes of training daily on a comprehensive language training curriculum developed by Stremel and Waryas (1974). The developmental characteristics of each subject are summarized in Table 2 and examples of the structures trained and the sequence of training are shown in Table 3.

Insert Tables 2 and 3 about here

Structures were sequentially trained in both the receptive and productive modalities by a speech therapist in a training room adjacent to the classroom. Standard training procedures included the systematic use of behavioral techniques such as shaping, fading, modeling, differential reinforcement and use of multiple exemplars. Criterion for passing a training step included a demonstration by the child that he/she could produce the trained structures in probe situations across trainers, settings, and stimuli. All subjects successfully met criterion on each structure that they were taught. Only data on the productive generalization of trained structures (i.e., syntactic forms) to classroom freeplay usage will be discussed here.

Throughout the study observers collected 15-minute verbatim speech samples of the subjects' language in a classroom freeplay setting. Each subject was observed approximately four times per week and an average total of 104 observations were taken per subject. These observations were distributed equally across time for each subject. Generalization of the trained structures was analyzed from these samples with the assistance of a computer program that compared the subject's trained forms with their verbatim speech samples.

The results are summarized in Table 4.[1] Of the 55 structures trained, 39 (71%) were generalized by the children to the classroom.

Insert Table 4 about here

For individual subjects, generalization ranged from 54% (7 of 13 forms) to 100% (4 of 4). These results suggest that training did have a substantial effect in that the majority of the forms trained were incorporated in the children's productive repertoires. Furthermore, on the average, forms that generalized were observed within the first 12 observations (3 data blocks) after their training was initiated by the therapist, suggesting the training was indeed responsible for their emergence at that point. However, the primary question we would like to address is why generalization was not 100 percent? That is, why did some forms never generalize?

Table 4 also shows the average morpheme length of structures that generalized as well as the average length of those that did not. It

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[1] Individual subject longitudinal generalization data, upon which the summary in Table 4 is based, are presented in Appendix 1.

Table 2

Language Project Preschool

Subject Characteristics

Subject	Sex	Length of Observation	Age at		Houston Language Age		Peabody Mental Age		MLU		Utterances per Obs.	
			Start	End	Start	End	Start	End	Start	End	Start	End
D.Q.	Male	26 months	32 mo	58 mo	26 mo	48 mo+	22 mo	52 mo	1.2	2.1	4.3	51.4
D.P.	Male	18 months	48 mo	66 mo	36 mo	48 mo+	34 mo	87 mo	1.8	3.0	3.6	26.2
J.H.	Male	8 months	48 mo	56 mo	48 mo+	48 mo+	46 mo	59 mo	2.8	2.9	21.5	39.6
J.J.	Male	17 months	30 mo	47 mo	29 mo+	48 mo+	27 mo	52 mo	2.5	3.2	18.6	49.3
K.P.	Male	12 months	37 mo	49 mo	31 mo	36 mo	27 mo	36 mo	1.5	2.6	4.4	34.9
L.B.	Female	14 months	36 mo	50 mo	24 mo	48 mo	27 mo	46 mo	1.2	1.7	2.5	17.2
M.H.	Male	17 months	36 mo	53 mo	36 mo	60 mo	29 mo	56 mo	1.6	3.5	7.6	33.5
W.B.	Male	8 months	37 mo	45 mo	48 mo	60 mo	37 mo	48 mo	2.7	3.1	23.5	26.0
MEANS	☒	15 months	38 mo	53 mo	35 mo	50 mo	31 mo	54 mo	1.9	2.8	10.8	34.8
RANGES	☒	8-26 months	30 / 48	45 / 66	24 / 48	36 / 60	22 / 46	36 / 87	1.2 / 2.8	1.7 / 3.5	2.5 / 23.5	17.2 / 51.4

Table 3

Training Examples

SUBJECT: K.P.

Structure	Examples
Verb-Noun	cut paper open door
Pronoun-State Verb-Noun	I want whistle I like drum

SUBJECT: D.P.

Structure	Examples
Noun-Verb-Color Adjective-Noun	man wear black coat girl ride brown horse
Noun-Verb(ing)-Preposition-Noun	airplane flying over clouds boy sitting in wagon

Table 4

GENERALIZATION SUMMARY

Child	# Forms Trained	# Forms Generalized*	% Forms Generalized	Overall Child MLU	Mean Length Generalized Forms	Mean Length Non-Generalized Forms
J.J.	4	4	100%	3.0	2.5	---
K.P.	4	4	100%	2.1	2.5	---
M.H.	9	8	89%	2.6	3.4	5.0
L.B.	5	4	80%	1.5	2.5	2.0
D.P.	10	6	60%	2.7	3.0	4.3
W.B.	5	3	60%	2.9	2.3	4.0
D.Q.	5	3	60%	1.8	2.7	4.0
J.H.	13	7	54%	2.4	3.8	4.0
MEANS or TOTALS	55	39	71%	2.4	2.8	4.0
RANGES	4-13	4-8	54-100%	1.5-3.0	2.5-3.0	2.0-5.0

*Criterion: Non-imitative usage in 2 separate observation blocks (4 observations to a block).

indicates that the forms which did not generalize were the longer ones. Figure 2 makes this point even clearer. It shows the percent of generalization graphed as a function of the morpheme length of the structure trained. In other words, in general the longer structures trained were not incorporated into the subject's normal productive repertoires despite the fact that the subjects appeared to learn them and could produce them under specific probe conditions across trainers, settings, and stimuli. Why?

Insert Figure 2 about here

The answer could be artifactual in nature, of course. For example, since the longer structures are also inherently trained later in the curriculum, the difference could be due to simply not observing them long enough. However, this was not the case. As shown in Table 5, when the longer forms did generalize they manifested themselves in the repertoires of the subjects just as quickly as the shorter forms. The findings and the fact that on the average the four-word forms were observed for across 57 observations (14.2 data blocks) suggests this type of artifact is not a reasonable explanation of the data.

Insert Table 5 about here

Another possible reason for the difference could be that the four-word forms represented odd or unusual forms having little function in everyday speech. Thus the subjects did not utilize them simply because they had little or no pragmatic usefulness. However, in fact the forms trained were very common and quite frequently observed in use by individuals with MLUs of 3.0 and greater.

There may be still additional explanations for this finding, but the data seem to most strongly support this conclusion: Generalization appeared to be determined primarily by the degree of correspondence between the morpheme length (complexity) of the trained structure in relation to the morpheme length (complexity) of the subject's spontaneous language. It was as if the communication matching phenomena observed in normal acquisition was controlling generalization here too. The subjects (see Table 4 again) would utilize forms that were slightly more complex than that of their everyday speech. Hence the MLU of generalized forms was about 2.8 overall while the subject's overall MLU was about 2.4. But they would not generalize—not incorporate into their everyday speech—forms that were more than a morpheme greater than their everyday speech. This, of course, makes sense from a developmental perspective. The real utility of the finding is its implication for language remediation strategies.

Figure 2

Generalization by Structure Length

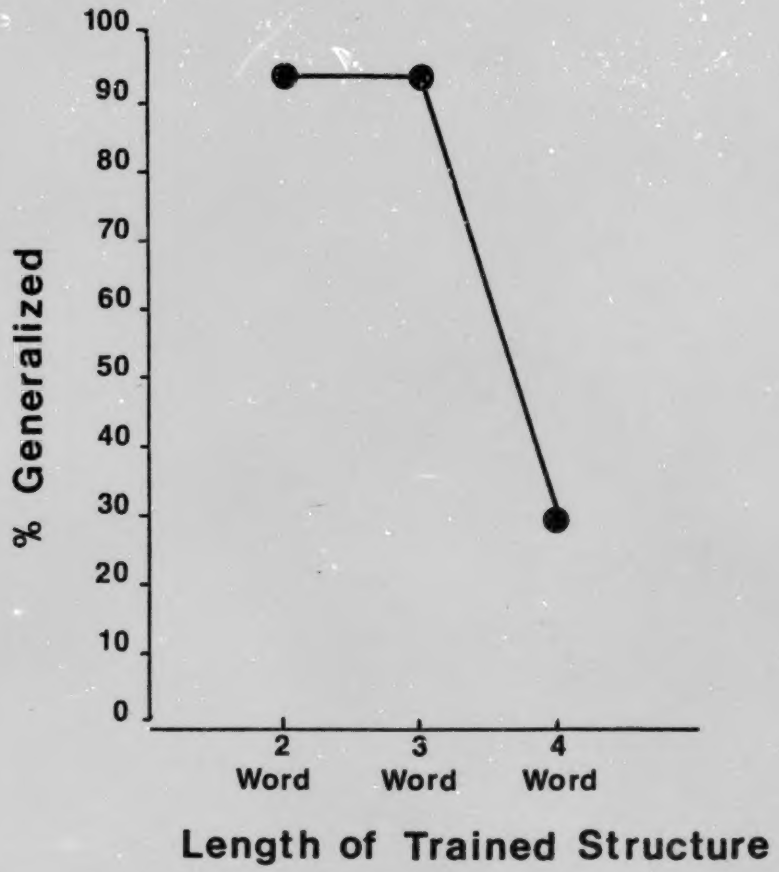

Table 5

Variables	Structure Length		
	2 word	3 word	4 word
# Subjects	8	8	5
# Forms Trained	18	16	14
# Generalized	17	15	4
% Generalized	94%	94%	29%
Mn̄ # Observation Blocks Before 1st Occurrence of Generalized Forms Observed	2.9	2.8	2.7
Mn̄ # Blocks Possible	18.2	13.7	14.2
Mn̄ # Blocks Occurred In	12.2	8.9	7.0
% Blocks Observed In	67%	65%	49%
Mn̄ # Blocks Possible for Forms that did not Generalize	14.0	17.0	14.9

Nearly all language training programs lay out a sequence of structures to be trained from simple to complex that usually roughly reflects the standard developmental account of language acquisition. It is quite possible to successfully train a child along this sequence and—we suspect on the basis of this data—then, to eventually leave him behind as the complexity of items trained gets more and more out of line with his actual productive language capability. Probably because he has become so tuned into the training format itself, this child may appear to keep up with the trainer while simply failing to incorporate the more complex forms into his usage repertoire. The training still could be having many useful effects—just not the ones that are primarily intended. However, maintaining the complexity of a training curriculum within the general developmental level of the child and then increasing the length of trained structures as the child's MLU increases, may be necessary to insure generalization of all trained structures.

The Effects of High and Low Rates of Speech Usage on the Distribution of Pragmatic Functions

A thorough analysis of language generalization to the real world requires that we understand under what conditions generalization is impeded and under what conditions it is facilitated. Rate of verbalization has been correlated with generalization in several analyses (e.g., Warren, Rogers-Warren, & Baer, 1983; Hart, 1980; Rogers-Warren & Warren, 1980). High rates of verbalization correlated with increased likelihood of generalization as well as increased rates of language acquisition (Nelson, 1973). But are there any differences functionally in the speech of a child when they are talking at low rates versus when they are talking at relatively high rates? Do some pragmatic functions tend to dominate low rate speech and others tend to dominate high rates of speech? If so, this might help explain why rate is so crucial to language acquisition and generalization. It might also provide important information in terms of specific pragmatic form intervention targets. With these issues in mind we conducted an analysis of the effects of high and low rates of speech usage on the distribution of pragmatic functions by our subjects.

This analysis was conducted by dividing the subjects' longitudinal verbatim observation data into observations in which the subject spoke 15 or more utterances and those in which he/she spoke less than 15 times over a 15-minute period. From these two groups of data 100 utterances were then randomly selected. These utterances were then distributed across several basic pragmatic categories (each was initially coded by one of these categories). These categories were declaratives, questions, answers, request commands, response to mands, vocatives, and imitations. Each of these categories is defined in great detail in the "contextual analysis" code included in Appendix 2.

Figure 3 shows a function usage by rate comparison. It shows the percentage of usage of the seven functions under the two conditions studied. It generally indicates little clear effects of rate on

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Insert Figure 3 about here
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function usage. Some small differences are indicated but these are not statistically significant. The figure indicates that declaratives are the most frequently used function regardless of whether the subject is talking a lot or not. Answers are the second most observed function, then request-commands, and so on. This mean data is represented for the distribution for each of the 10 subjects analyzed.

This analysis suggests that rate of talking had no real effect on the distribution of pragmatic functions utilized by the subjects. This finding would suggest that rate influences generalization and acquisition simply because of the number (practice effect) and diversity of opportunities. It means that the child will have to use language, not because it also presents a shift to more facilitative and useful pragmatic functions or even just to the use of more pragmatic functions.

The Effects of Form Complexity on Function Use

Another important variable that could effect generalization and acquisition of language is the relationship of length of utterance (i.e., form complexity) and pragmatic function use. Less complex (shorter) forms may tend to be used for a certain distribution of functions while longer forms might be used for another distribution of functions. Such a finding might help explain the differential generalization of longer and shorter trained forms as reported previously. This in turn may help us structure language training to take advantage of naturally occurring complexity/function relationships.

This analysis was designed to determine the effects of length of utterance (in morphemes) on the distribution of function. The null hypothesis was that the distribution will not be significantly different regardless of the length of utterances spoken. The analysis was conducted by comparing the function distribution of one word, two word, three word, and four word or more utterances. Figure 4-10 displays this data for several basic functions: declaratives, questions, answers, request-commands, response to mands, vocatives, and imitations. These figures show significant differences for one-word utterances as compared to longer utterances across five different functions: declarative, questions, answers, request-commands, and vocatives. These differences are highly statistically significant. These results demonstrate that one-word utterances are utilized for very different purposes from longer utterances. One-word long utterances are used primarily as answers and vocatives, relatively less often as declaratives, request-commands, and questions. However,

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Insert Figures 4-10 about here

Figure 3

FUNCTION USAGE BY HIGH/LOW RATE

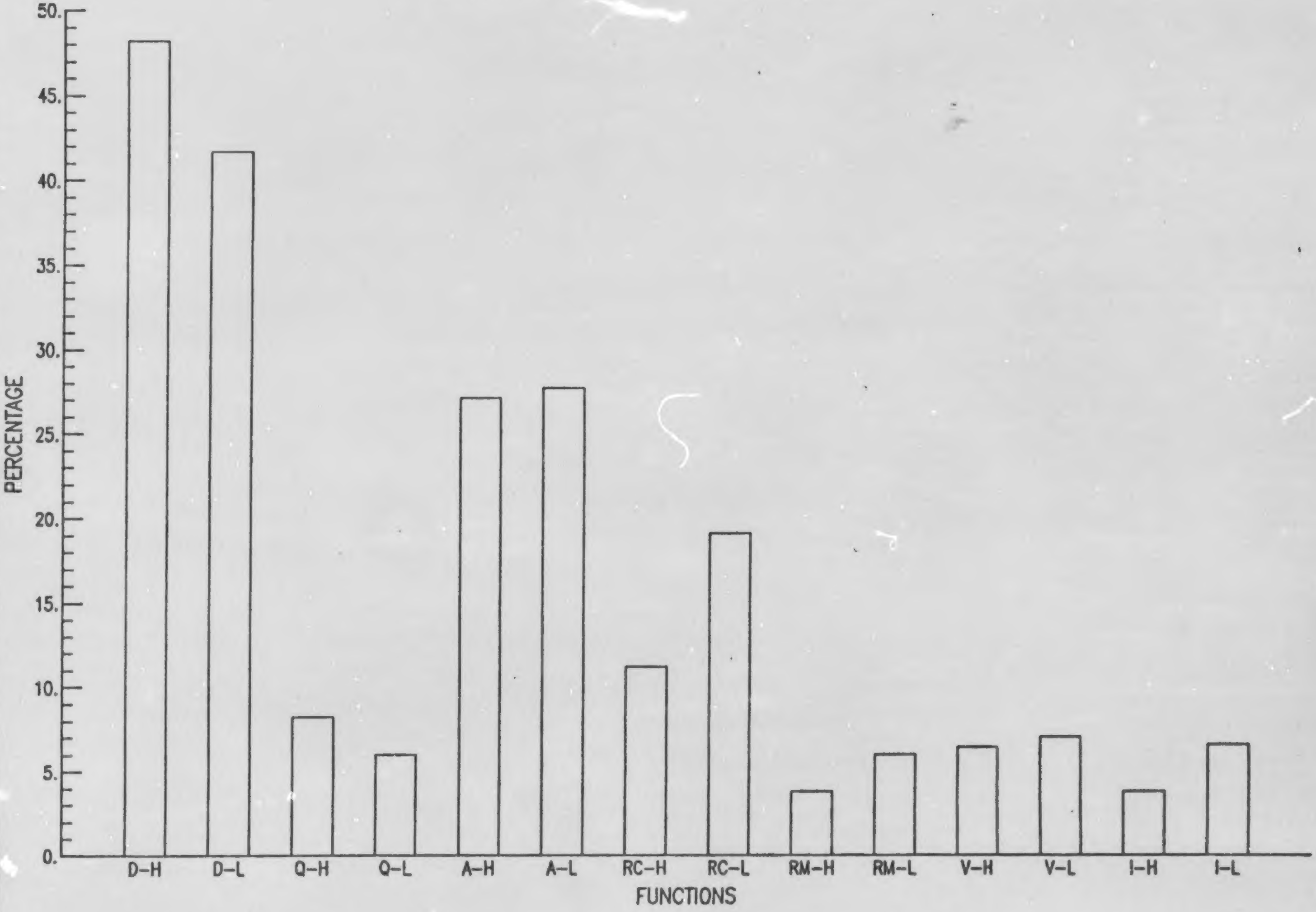


Figure 4

FUNCTION USAGE BY NUMBER OF MORPHEMES
DECLARATIVES

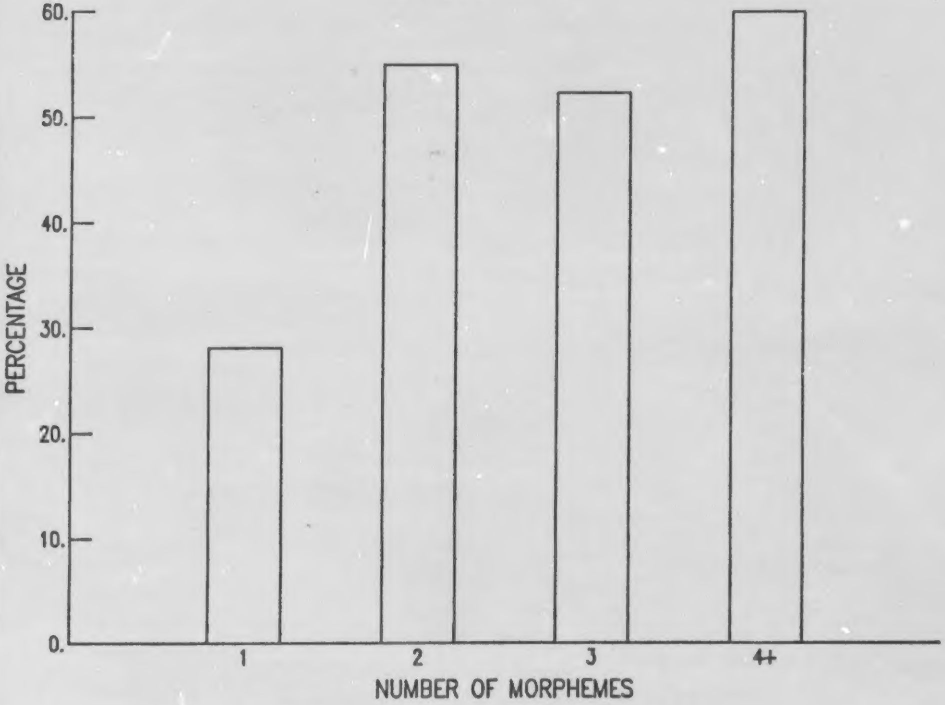


Figure 5

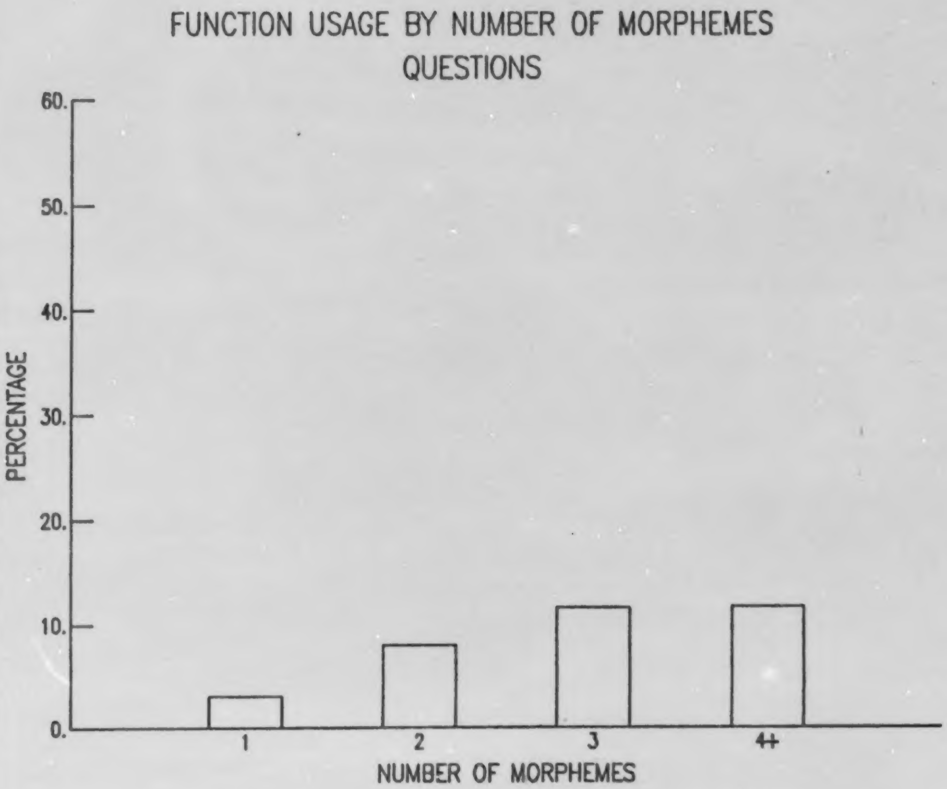

FUNCTION USAGE BY NUMBER OF MORPHEMES
QUESTIONS
PERCENTAGE
60.
50.
40.
30.
20.
10.
0.
1
2
3
4+
NUMBER OF MORPHEMES

Figure 6

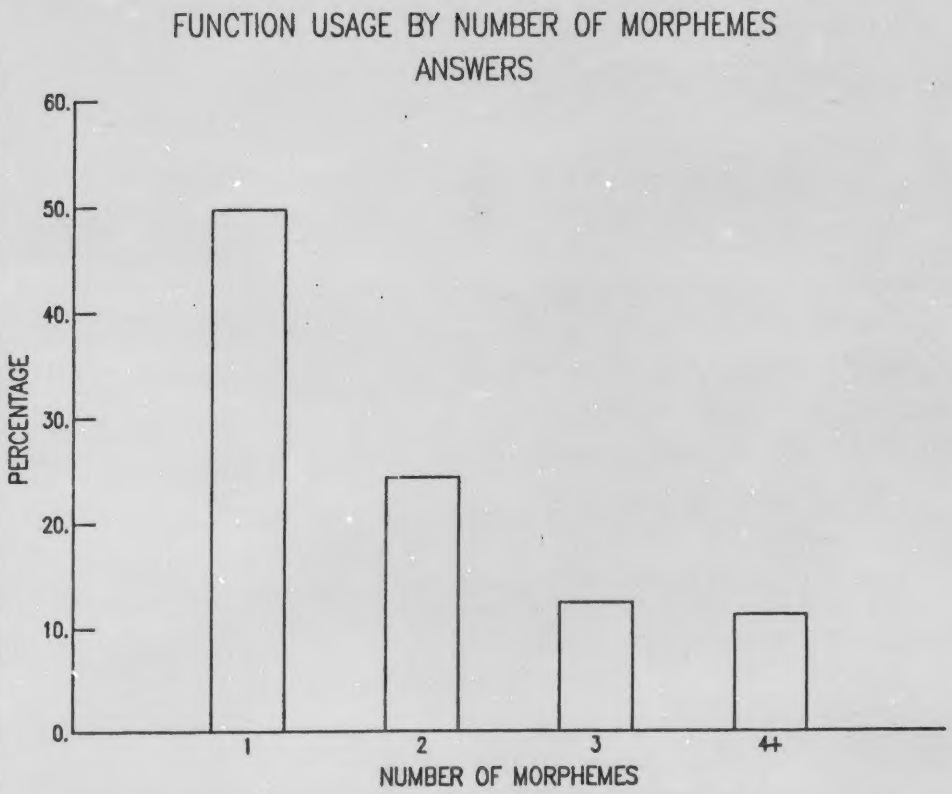

FUNCTION USAGE BY NUMBER OF MORPHEMES
ANSWERS
PERCENTAGE
60.
50.
40.
30.
20.
10.
0.
1
2
3
4+
NUMBER OF MORPHEMES

Figure 7

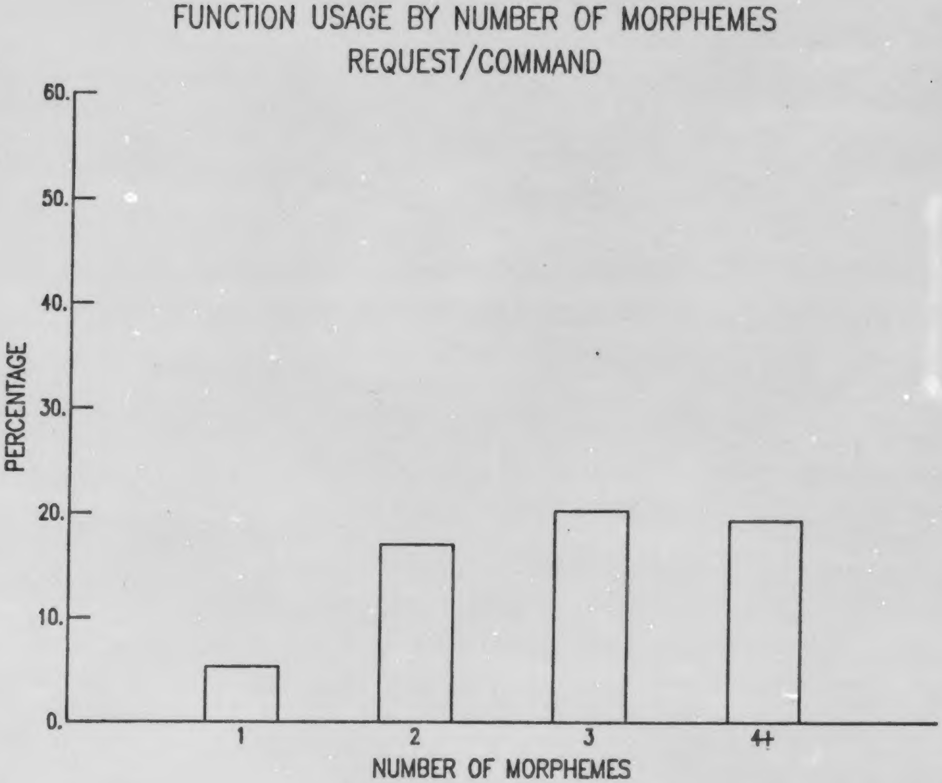

FUNCTION USAGE BY NUMBER OF MORPHEMES
REQUEST/COMMAND
PERCENTAGE
60.
50.
40.
30.
20.
10.
0.
1
2
3
4+
NUMBER OF MORPHEMES

Figure 8

FUNCTION USAGE BY NUMBER OF MORPHEMES
RESPONSE TO MAND

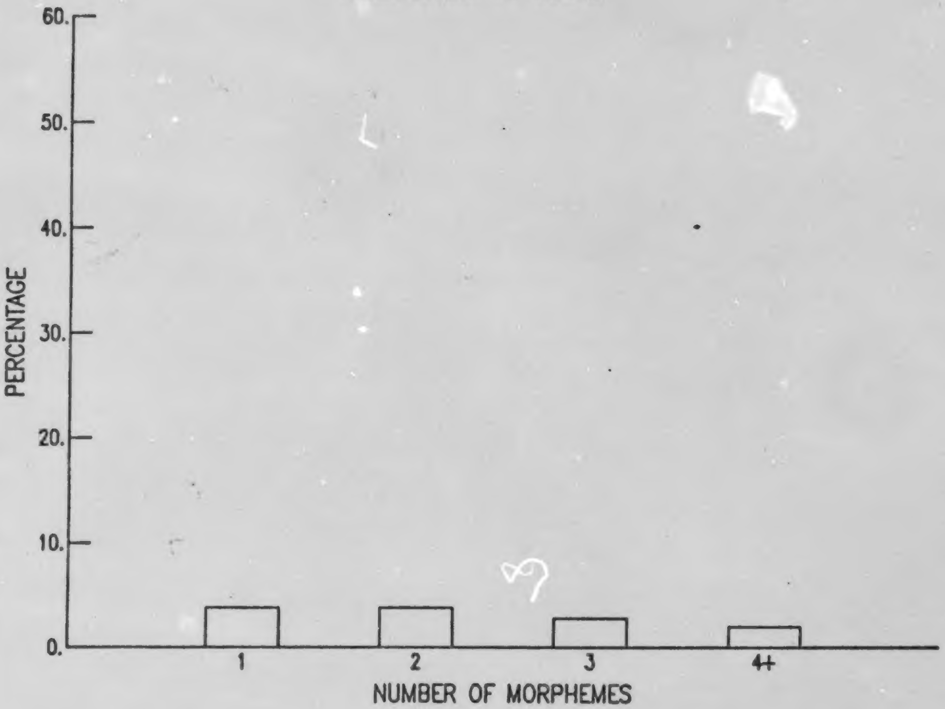


Figure 9

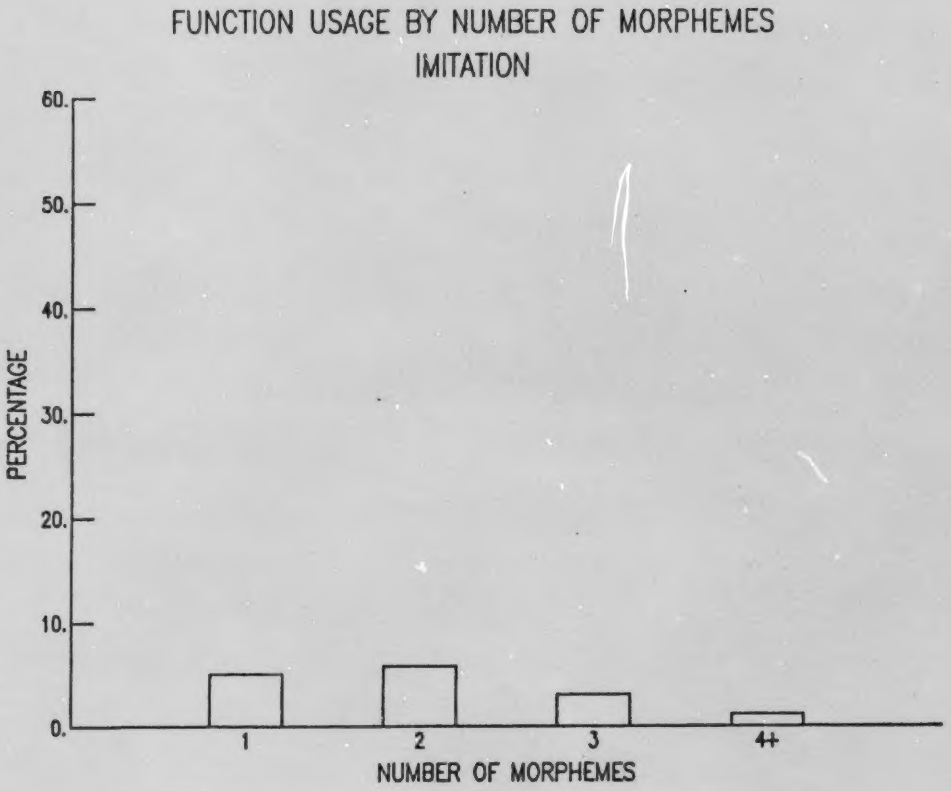
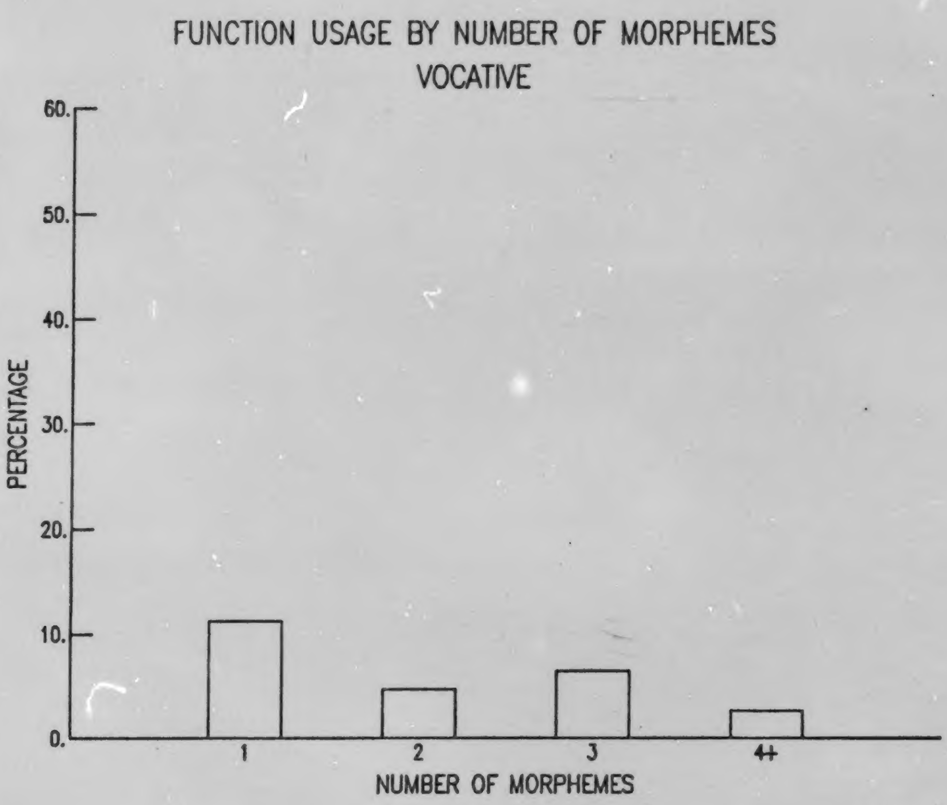

FUNCTION USAGE BY NUMBER OF MORPHEMES
IMITATION
PERCENTAGE
60.
50.
40.
30.
20.
10.
0.
1
2
3
4+
NUMBER OF MORPHEMES

Figure 10


FUNCTION USAGE BY NUMBER OF MORPHEMES
VOCATIVE
PERCENTAGE
60.
50.
40.
30.
20.
10.
0.
1
2
3
4+
NUMBER OF MORPHEMES

differences between two-, three-, and four-word utterances are smaller and not statistically significant.

The findings on one-word utterances are not surprising in light of observations by developmental psychologists of normal language acquisition (Moerk, 1977). The lack of differences between two-, three-, and four-word utterances supports the tentative conclusion made previously that overall developmental mismatch is the most likely explanation for lack of generalization of longer utterances, not differential functions. Therefore, these data provide a form of convergent validity for the analysis of longitudinal generalization and the conclusions offered by us as to the reason for differential generalization across trained utterance length.

Public School Transition Follow-Up

A major research question of this project was to determine the success of language-delayed children who had been through the language treatment program in making the transition to elementary school. If they were successful it would suggest that the model we were using in treatment was sufficient and that auxiliary procedures would not be necessary. That is, the follow-up analysis served as a baseline by which the need for additional treatment could be determined. The intervention model we were using represented a good application of the current state of the art in intervention technology.

Follow-up analysis was made on 12 children who had made the transition from the Language Project Preschool to normal kindergarten programs. Six of these children were also followed into first grade, thus allowing us to examine a longer trend in their data. Three types of data were analyzed for all 12 children: 1) standardized test scores taken when the children were first enrolled at Language Project Preschool (LPP), at the end of LPP, after one year of public school, and for six of the children, after two years of public school; 2) parent surveys of their performance, 3) teachers' surveys of their performance.

Characteristics of the 12 subjects studied and their Peabody Picture Vocabulary Scores at exit and at the point of first follow-up (and second follow-up where applicable) are included in Table 6.

Insert Table 6 about here

The average Peabody mental age as it relates to chronological age is shown for the 12 subjects across three time frames in Table 7. These time periods are at program entry, at program exit, and after one year in kindergarten. In Table 8 the same data is presented for a subset of six students except data is also shown after two years of public school.

Insert Tables 7 and 8 about here

Student Characteristics: Follow-Up Study

Table 6

Child	ID#	LPP Entry Date	LPP Exit Date	Child Age LPP Exit (yrs & mo)	Peabody at LPP Exit (yrs & mo)	Location at Follow-Up (School-City)	Child Age at Follow-Up (yrs. & mos)	Peabody at Follow-Up (yrs. & mos)
Damian	K00236	Spring, '77	Spring, '79	5-3	7-3	Cordley, Lawrence	(1) 6-10 (2) 8-8	6-10 9-8
Barclay	K00344	January, '76	Spring, '77	5-8	4-11	Nottingham, Eudora	(1) 6-10 (2) 8-9	5-5 6-3
Jolene	K00341	Fall, '79	Spring, '80	5-9	5-9	Tonganoxie, Tonganoxie	6-9	6-6
Laura	K00200	Feb., '78	Spring, '80	5-9	5-2	Haworth, Lawrence	(1) 6-2 (2) 7-2	5-11 5-7
Dale	K00047	January, '77	Spring, '79	5-4	4-4	Sumner, Topeka	(1) 6-3 (2) 8-4	4-7 5-1
Jerri	K00199	December, '78	Spring, '80	7-6	5-8	Nottingham, Eudora	(1) 6-6 (2) 7-0	8-0 8-9
Nick	K00521	Fall, '80	Spring, '81	3-11	3-11	Haworth Red Carpet Room Lawrence	5-0	5-7
Corey	K00276	Fall, '79	Spring, '81	5-0	5-5	East Heights Lawrence	6-1	5-8
Tim	K00238	Spring, '79	Spring, '81	6-1	8-1	LeCompton	7-2	8-7
Brad	K00556	Spring, '80	Spring, '81	5-8	6-1	Nottingham, Eudora	6-10	7-1
Derrick	K00340	Fall, '79	Spring, '81	4-5	3-11	No Information		
Craig		Fall, '77	Spring, '78	5-1	2-10	Ks. State School for the Deaf	(1) 7-2 (2) 9-1	3-11 15-3*

Table 7

AVERAGE MENTAL AGE ABOVE OR BELOW CHRONOLOGICAL AGE
(N=12)

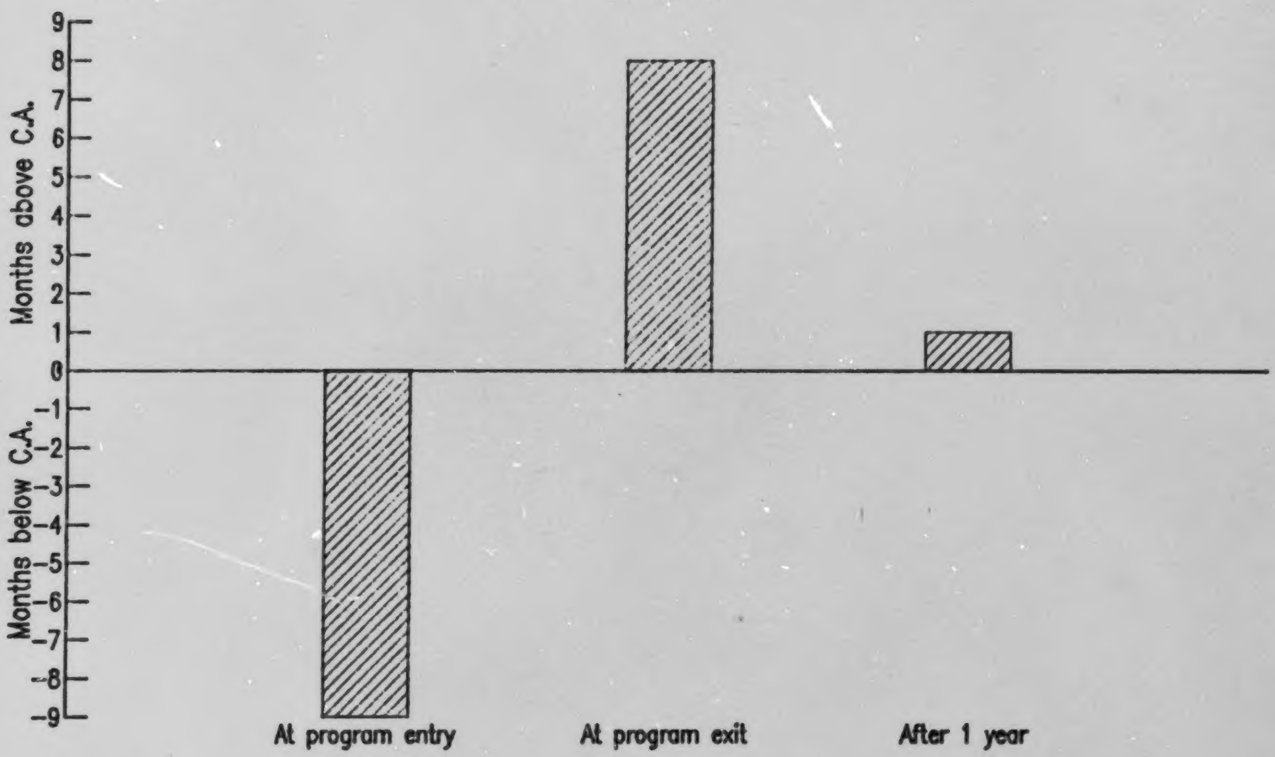
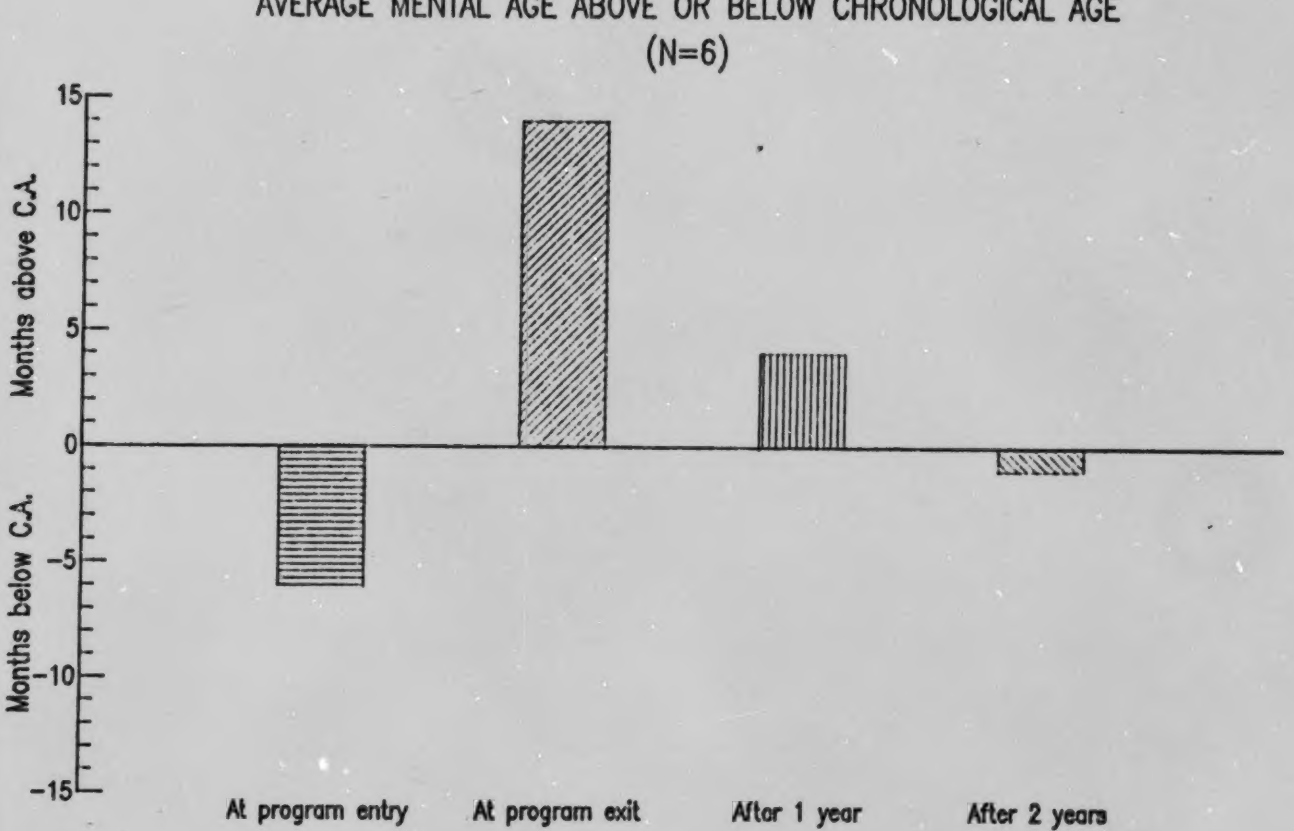


Table 8


AVERAGE MENTAL AGE ABOVE OR BELOW CHRONOLOGICAL AGE
(N=6)
15
10
5
0
-5
-10
-15
Months above C.A.
Months below C.A.
At program entry
At program exit
After 1 year
After 2 years

Tables 7 and 8 clearly show a rather unfortunate trend in the Peabody score data. At program entry subjects were, of course, well below where they should have been,given their chronological ages. At program exit on the other hand they were way ahead, an average of almost 14 months ahead of their chronological ages. This suggests that the preschool intervention program had a profound effect on these children's skills, at least as measured by the Peabody. However, one year later their mental age scores had dropped back down near their chronological ages. Of course they were still doing relatively well and were better off than at LPP program entry. But the trend then continues downward for those subjects for whom second year follow-up data was available. Now, however, they had dropped about two months below age level. Still not a bad score, but the trend is alarming. Unfortunately, due to termination of the grant, we were not able to do tracking at Year 3, which obviously would have provided some interesting information.

The parent and teacher survey data suggested a high degree of parent and teacher satisfaction with LPP, but some serious parent concern over treatment of their child in elementary school. This data is presented in detail in Appendix 3. All parents firmly believed their children made significant progress while enrolled at LPP. The teacher survey data suggests that many of the students were continuing to have some problems in public school, however, but that the group was generally performing satisfactorily.

In summary, the transition data suggests that preschool language intervention is very effective but that either its effects are somewhat transitory or the public school environment is so bad that it eventually begins to retard the students' learning again. It could be that preschool language intervention succeeds in training a large amount of content in the child, which allows them to score better on the Peabody norms, which were initially developed on a population of non-preschool children. But, the effects of this headstart then begin to fade out, perhaps because the child has not actually learned a strategy that will allow them to efficiently learn new information in a non-remedial environment like a normal public school classroom. Objectives 2 and 3 in this project address the issue of strategy (in Objective 3) and public school requirements (Objective 2).

Forms and Function in Language Learning and Generalization: A Theoretical Model

In the course of conducting the studies for Objective 1, we concluded that to ultimately do a meaningful analysis of form and function in language learning and generalization, a theoretical model is necessary. We have been working on such a model, which is presented below in the briefest method possible. It is more fully presented in two recently published articles (Rogers-Warren & Warren, 1981, 1983).

The proposed model of language learning integrates stimulus and response class formation concerned with considerations regarding the effects of contingencies of the natural environment. This model is presented in Figure 11.

Insert Figure 11 about here

The productive form of communication, an utterance or a speech act, is determined by four contributing forces: speaker's intention[2] (what function is the utterance to serve in this immediate instance), the interactional context (social, cultural parameters of communication instances; non-linguistic rules that govern selection of communication form); semantic knowledge of the speaker (here, primarily representational or knowledge of word meaning, but strongly related to concept or response class-based knowledge) and syntactic knowledge (use of rules or regularity in combining forms to refer to certain events or intentions).[3] This model assumes multiple causation for form, but that form primarily arises from function. The development of communicative competence is "coming to say the right things, at the right time, in the right way" (Ervin-Tripp, 1971). Right things corresponds to speaker intention and the first step toward competence is realization of intention. This means coming in contact with the basic environmental contingency: language controls the environment. Intention may initially arise from the most basic of human needs: food, warmth, human contact. Through the natural contingencies of the environment (and often for the developmentally disabled, from specific training), increasingly discrete needs are discriminated (for example, preferences for certain types of food, attention from certain persons, access to particular objects or events that are stimulating or reinforcing). Thus, a vector model[4] of communication causation for a very young child or developmentally delayed individual beginning language training will reflect a strong intention vector and a weaker context vector. Minimal force will be exerted by semantic/syntactic knowledge.

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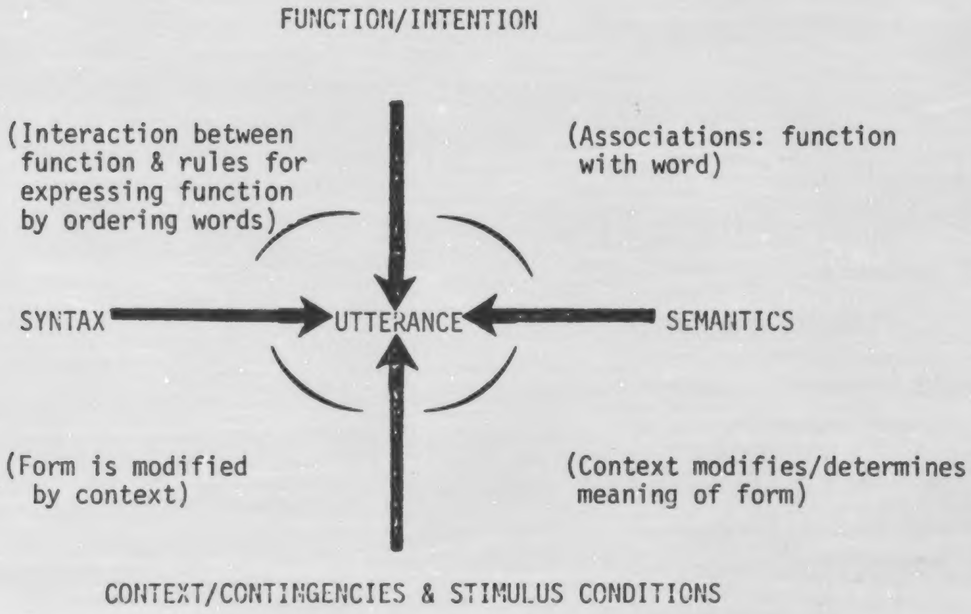
[2] Intention in this context might be construed to mean the function, the reduction of need, a behavior with the purpose of mediating reinforcers, and so forth. It is not assumed that intention arises separately from environmental contingencies or learning history. A behavioral analysis is still assumed to be appropriate, but a short-hand designate was required to facilitate this discussion, thus, "intention" is used throughout this section.

[3] Although somewhat traditional linguistic terms have been used to describe the semantic knowledge, syntactic rules, and context, it could be assumed that the processes associated with acquisition of these types of information are learning based.

[4] The vector model borrows from mathematical models in which strength of a force exerted on one object by another is represented by lines of varying lengths corresponding to the relative strength of the force.

Figure 11

A CHANGING VECTOR ANALYSIS MODEL OF LANGUAGE LEARNING AND USE


FUNCTION/INTENTION
(Interaction between function & rules for expressing function by ordering words)
(Associations: function with word)
SYNTAX
UTTERANCE
SEMANTICS
(Form is modified by context)
(Context modifies/determines meaning of form)
CONTEXT/CONTINGENCIES & STIMULUS CONDITIONS

The contextual vector represented in Figure 12 reflects the individual's discrimination and responsiveness to the nonlinguistic factors that affect communication. At first, these discriminations may be quite basic: presence of a listener, and knowledge of basic interactional strategies such as establishing eye contact, turntaking, and focusing joint attention. With development or training progressively finer discriminations are made: who is the listener, what is the social context, what knowledge does the listener already share. To say that the speaker has knowledge of these factors does not necessarily imply that the speaker can specify or describe this knowledge. The speaker's behavior is coming under the control of increasingly complex stimulus conditions. Knowledge is expressed as performance cued by attention to social stimuli. The factors that are discriminated by a language deficient person are simpler and fewer than those that control competent adult communication.

Insert Figure 12 about here

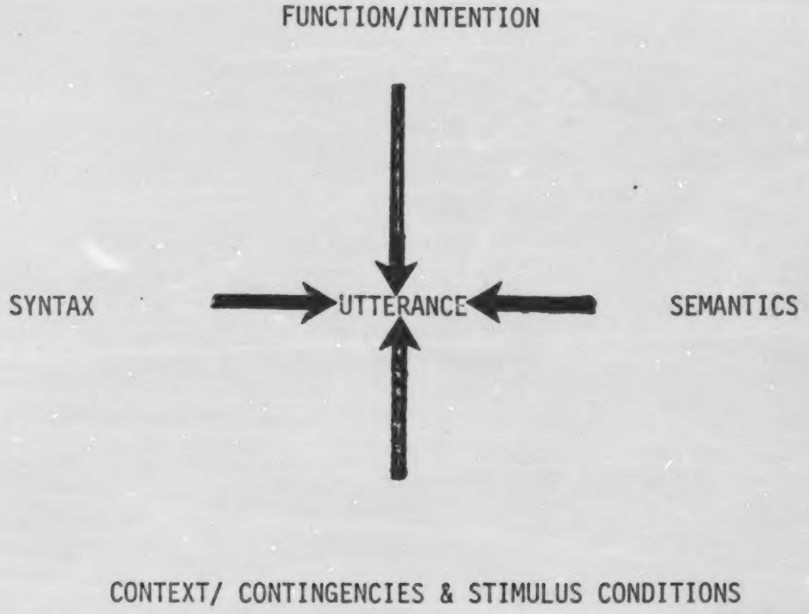
The discrimination and reinforcement processes underlying the development of stimulus control operate regardless of complexity of the stimulus event or how many stimuli affect the response. Discrimination of simple stimulus conditions supports the development of basic communication strategies that are compatible with environmental contingencies and provides a basis for more complex discriminations. Discriminations of basic environmental conditions and speaker intention can occur separate from communication, but it is unlikely that the reverse is true, at least beyond the earliest stages of communication.

The vectors representing syntactic and semantic knowledge may function as a single system, but have been shown as two sources of input. Semantic knowledge has at least three levels: the ostentatious, pointing level of simple reference, the complex referential level which allows identification of classes of stimuli referred to by the same name, or allows a single stimulus to be called by many names (in other words, stimulus and response class formation), and meaning that results from the combination of words and the relationship expressed by this combination.

Intention and context (environmental stimuli and contingencies) shape the selection of forms to a relatively greater extent than knowledge of syntactic and semantic conventions. In early communication, semantic meaning and context may not be differentiated (Bates, 1976) and the task of the language learner may be one of discriminating and generalizing the relationship between forms and functions. Initially a single form occurs in a single context and context with form serves to convey a specific function. Subsequently, a second form occurs in the same context. The first response class may be formed by concluding that Form 1 and Form 2 in Context 1 convey the same function. For example, pointing to a cookie and saying cookie may both result in daddy providing a cookie, when father and child are near the cookie jar. If pointing subsequently works to get a

Figure 12

VECTOR ANALYSIS FOR A YOUNG CHILD'S OR LANGUAGE DEFICIENT INDIVIDUAL'S COMMUNICATION



cookie from grandmother when she and the child are in the grocery store, it would seem likely that the child will correctly conclude that saying "cookie" would work equally well. Two contextual stimuli are responded to as if equivalent, and function (requesting cookies) may be conveyed by the use of either form. Of course, frequently contexts are not equivalent even though they may appear to be to the child. The task is one of discriminating the particular aspects of the context to determine which responses will function to convey intention or to mediate the behavior of others in a particular way. Forms that work better will be used because reinforcement increases the probability of the behavior it follows. The contingencies applied by the environment probably will be based on interpretability of the response. "Cookie" will replace the gesture if it is more likely to result in a cookie than just pointing to it. By selecting words with more restricted or specific meanings and by using combinations of words in an orderly fashion, the child can specify particular intentions still better. Concurrently, the contextual conditions which are likely to affect how well an utterance works to achieve the desired goal will be discriminated at increasingly discrete levels. For example, the importance of getting the listener's attention before verbalizing may be one of the first important contextual discriminations. In the preceding example, one of the first conditional discriminations may be among persons who are likely to provide cookies and those who are not, or the presence or absence of cookies.

Errors language learning persons make in labeling and in syntax are logical ones, based on over- or undergeneralizing certain regularities between form and function at a variety of levels. Errors decrease as controlling aspects of the stimulus classes are discriminated and adjustments are made accordingly.

All vectors should increase in length with communication training. Knowledge of syntax and semantics, sensitivity to environmental context, and elaboration of intention increase as the individuals learn new forms and as feedback from the environment strengthens their knowledge about the relationship between form and function. The vector model represents this dynamic and multidimensional process. At any given point, different types of utterances may result from differing strengths of the component vectors, even to the extent that expression of different intentions are differentially impacted by the context and speaker's mastery of particular types of information.

OBJECTIVE 2: To determine what specific language skills are required to succeed in an elementary school classroom.

This objective necessitated a large-scale assessment of the communication requirements inherent in the elementary school environment. To complete this objective we designed and conducted an analysis of good and poor communicators in these classrooms. The analysis included a study of teacher perceptions of these children, an analysis of the developmental levels of these children, and of the social and pragmatic aspects of their communication behaviors. We found that teachers clearly perceive a range of differences between poor and good communicators, but that only part of these perceived differences has any apparent reality in terms of actual behavior. This set includes the specific linguistic skills of the children. That is, our observational and test scores analysis of the subjects indicated clear differences in terms of actual linguistic skills, but few differences in terms of social usage skills. These results, combined with our findings in Objective 1, suggest that success in early elementary grades for the language handicapped child may depend on how much actual attention is given to effectively remediating his or her specific linguistic handicaps. The problem is to determine how to do this in the most effective, cost-efficient manner. This then has become the principal issue addressed by Objective 2. In this section we present the results of the large-scale group analysis that led us to this conclusion.

The overall goal of this study was to develop an accurate description of the good and poor kindergarten communicator. We were interested in (1) the accurate identification of these children, and (2) the specification of target skills to remediate in these children. We are not particularly interested in small differences between these two types of children. Our research involved observing good and poor communicators in their classrooms in both structured and unstructured situations, and observing a third group of randomly selected controls. We also collected Developmental Sentence Scoring (DSS) data and Metropolitan Readiness Scores on these children. Finally, we surveyed all the subjects' teachers across a variety of variables concerning the performance of these children. The specific hypotheses we posed were as follows:

H_1: The good and poor communicators differ significantly in terms of their DSS scores.
H_2: The good and poor communicators differ significantly in terms of their responsiveness overall, and/or under specific conditions of structured/unstructured or group size.
H_3: The good and poor communicators differ significantly in terms of frequency of speaking.
H_4: The good and poor communicators differ significantly in terms of frequency of initiation.
H_5: The good and poor communicators differ significantly on qualitative dimensions of their speaking: distribution of functions.
H_6: The good and poor communicators differ in frequency of teacher speech to them.
H_7: The good and poor communicators differ in qualitative dimensions of how teachers speak to them: directiveness; interrogatives; conversational.

Method

Subjects and setting. Thirty-nine kindergarten children from 13 classrooms participated in the study. One "good communicator" from each class was selected according to who appropriately demonstrated the greatest number of the following behaviors:

1) speak words clearly, using complete sentences;
2) make verbal requests to meet needs;
3) respond appropriately to questions, comments, and instructions of others;
4) modulate voice volume and change expression, according to situation.

One "poor communicator" was selected according to who demonstrated the fewest number of the preceding behaviors. One "control" student was selected by picking a name from a bag containing the names of all the children in the class. None of these students received special education services.

Ages ranged from 5 years, 5 months to 6 years, 6 months with a mean of 5 years, 11 months. Seventeen boys and 22 girls were selected, which included 33 Anglo-American, and 6 non-Anglo-American children. (Detailed descriptions of the individuals in each of these groups are presented in Table 9-11).

Insert Tables 9, 10 and 11 about here

The study was conducted in 13 kindergarten classrooms within the Lawrence Unified School District, Lawrence, Kansas. Observations were taken when the subjects were in both structured and unstructured settings. A structured setting consisted of the teacher being present and guiding the learning activities of a small group of children. Usually the teacher gave directions to the group, and then gave individual instruction and feedback to individual members of the group. Reading, math, and art lessons were most frequently taught in these small group situations.

An unstructured setting usually consisted of a small group of children working independently on teacher-assigned activities. The students were free to interact quietly, and the teacher or an aide sometimes stopped by to give occasional feedback on the children's work and/or further instruction. The students usually participated in art and supplementary reading and math activities during unstructured time.

Procedures

A brief overview of the study was presented to all district kindergarten teachers at a regularly scheduled kindergarten teachers' meeting. Those teachers who volunteered to participate listed on a survey the names of three children in their classrooms who could be classified as "good communicators" and three others who could be classified as "poor communicators". Then the teachers listed the behaviors exhibited by these children to explain their choices.

Next, the teachers were given the criteria (see Subjects) for good and poor communicators which had been developed by a group of experts from the University of Kansas in the area of language and

TABLE 7

Subject Characteristics Matrix

Group: Poor Communicators

								Metropolitan Scores (Stanine)				
Subject Name	ID#	Age	Race*	School	Session	Title I School**	DSS Scores	Language	Auditory	Visual	Prereading	Quantitative
Amy Yoder	03	5-5	1	Broken Arrow	AM	N	5.8	4	4	6	5	7
Rubi Lanham	06	5-8	2	Broken Arrow	PM	N	6.7	3	3	4	3	4
Jena Maxwell	09	6-2	1	Centennial	AM	N	6.4	8	7	9	9	9
Julia Kanitobe	11	6-2	2	Centennial	PM	N	8.0	7	6	3	6	3
Brad Shipley	14	5-10	1	Deerfield	PM	N	7.0	3	7	5	4	5
Curt Cunningham	18	5-7	1	India	AM	Y	8.7	5	5	5	5	5
Louis Nuney	20	6-1	2	New York	PM	Y	--	1	3	2	2	2
Shiela Ammerman	23	5-9	1	Riverside	AM	Y	8.2	3	3	3	2	1
Troy Snider	27	5-8	1	Schwegler	AM	N	6.5	6	5	5	6	5
Shawn Edwards	30	6-0	2	Schwegler	PM	N	7.0	4	3	4	3	5
Dale Mckevey	33	5-11	1	Wakarusa	PM	N	7.0	1	3	3	2	4
Darren Gillihan	34	5-7	1	Woodlawn	AM	Y	5.8	3	4	3	3	2
Todd Oshel	38	6-1	1	Woodlawn	PM	Y	6.9	4	5	5	4	4
MEANS		5-10					7.0	4	4.5	4.4	4.2	4.3

*1 = Anglo; 2 = Non-Anglo

**Y = Yes; N = No

Table 10

Subject Characteristics Matrix

Group: Good Communicators

								Metropolitan Scores (Stanine)				
Subject Name	ID#	Age	Race	School	Session	Title I School	DSS Score	Language	Auditory	Visual	Prereading	Quantitative
Aaron Mersmann	01	6-2	1	Broken Arrow	AM	N	9.4	9	9	7	8	9
Melanie Hathaway	04	5-8	1	Broken Arrow	PM	N	8.8	6	9	7	7	8
Cyan Peake	07	6-4	1	Centennial	AM	N	8.2	9	9	9	9	8
Stephanie Schmidt	12	6-2	1	Centennial	PM	N	8.9	8	7	8	8	7
Jamie Wyatt	13	6-0	1	Deerfield	PM	N	6.8	7	9	9	9	8
Matt Swartz	16	6-3	1	India	AM	Y	--	9	9	9	9	9
Melina Hempnill	19	6-2	1	New York	PM	Y	8.2	-	-	-	-	-
Deyria Mumford	22	5-11	2	Riverside	AM	Y	8.1	8	6	6	7	6
David Heller	25	6-5	1	Schwegler	AM	N	7.6	9	9	9	9	8
Carolina McKnight	28	6-1	1	Schwegler	PM	N	9.7	8	7	8	8	7
Erin Gogel	31	6-6	1	Wakarusa	PM	N	7.1	-	-	-	-	-
Latonya Logan	36	5-7	1	Woodlawn	AM	Y	6.8	6	8	8	7	8
Jacob Hout	37	6-4	1	Woodlawn	PM	Y	7.9	7	7	8	8	9
MEANS		6-1					8.1	7.8	8.1	8.0	8.1	7.9

Table 11

Subject Characteristics Matrix

Group: Control

Subject Name	ID#	Age	Race	School	Session	Title I School	DSS Scores	Language	Auditory	Visual	Prereading	Quantitative
								Metropolitan Scores (Stanine)				
Mike Walters	02	6-1	1	Broken Arrow	AM	N	8.7	7	6	7	7	8
Wendy Brown	05	5-5	1	Broken Arrow	PM	N	6.9	6	6	8	8	8
Jimmy Bartscher	08	6-4	1	Centennial	AM	N	9.4	8	9	9	9	9
Brandon Grammar	10	5-6	1	Centennial	PM	N	6.0	4	2	6	3	3
Tommy Sweatman	15	5-11	1	Deerfield	PM	N	6.0	9	9	7	8	7
Nikki Klink	17	6-5	1	India	AM	Y	6.6	9	7	9	9	8
Yolanda Ming	21	6-5	2	New York	PM	Y	6.3	6	4	4	5	9
Jeff Good	24	6-0	1	Riverside	AM	Y	6.3	4	5	9	5	7
Jessica Patterson	26	6-0	1	Schwegler	AM	N	9.1	7	9	6	9	9
Matthew Fairchild	29	6-1	1	Schwegler	PM	N	5.7	8	9	8	9	9
Traci Zelinski	32	6-0	1	Wakarusa	PM	N	7.0	7	7	9	8	8
Tammy Long	35	6-2	1	Woodlawn	AM	Y	6.5	6	8	7	7	6
Steve Drake	39	5-11	1	Woodlawn	PM	Y	7.1	6	5	4	6	4
MEANS		6-0					7.01	6.7	6.6	7.1	7.1	7.3

communication. The teachers then selected three children from their class who exhibited the greatest number of these behaviors and three children who exhibited the fewest number of these behaviors. A comparison was then made between those children chosen with and those chosen without using the specified criteria.

Three different types of data were collected for each subject. The first was a verbatim language sample taken while the subjects were participating in the unstructured group settings. Observers sat close to each subject and wrote 50 audible sentences. These sentences were then scored according to the procedure described by Lee (1974) for evaluating children's syntactic development. A sentence was defined as the occurrence of a noun and a verb. Eight categories of grammatical forms were selected by Lee (1974) as showing the most significant developmental progression in children's language: 1) indefinite pronoun or noun modifier, 2) personal pronoun, 3) main verb, 4) secondary verb, 5) negative, 6) conjunction, 7) interrogative reversal in questions, and 8) wh-questions. A specified number of points was given to words fitting these categories, depending on which of seven developmental levels it fit. Credit was given only when a sentence met all the requirements of adult standard English, and this included syntactic, morphological, and semantic conventions. The total number of points was divided by the number of sentences, resulting in a developmental sentence score (DSS).

For the second type of observation, a code describing various language behaviors of teachers and kindergarten children was developed and field-tested in two of the classrooms in the study. The code defined the following:

Declarative: statement to share information
Yes-No Question: a question that may be answered by yes or no
Mand: verbalization that requires a verbal response
  (Example: "Tell me where you live.")
Command: demand for a nonverbal response
  (Example: "Hand me a crayon.")
Vocative: verbalization calling listener's attention to something in the environment
  (Example: "Look!")
Correction: utterance intended to correct inappropriate answer or behavior
  (Example: Teacher: "What color is this?"
  Child: "Yellow."
  Teacher: "No, green.")
Question: verbalization in which speaker seeks information from others
  (Example: "Where's my pencil?")
Answer: verbalization that supplies information in response to another speaker's question or request
  (Example: "Where's my pencil?" Answer: "On the floor.")
Nonverbal Compliance: the subject complies within 5 seconds of being given an instruction
  (Example: "Put your finger on the yellow ball."
  Student: tries within 5 seconds)

Nonverbal Non-Compliance: the subject does not comply within 5 seconds of being given an instruction
Unintelligible: a verbalization that cannot be understood
Other: an utterance that does not fit any of the preceding codes

Three graduate students and one undergraduate student served as observers. Practice using videotapes of kindergarten children interacting with their teacher, a written test, and practice observations in two of the classrooms was used to reach a minimum of 70% reliability with the research assistant who supervised the study.

The observers sat as close as possible to the subject without interfering with the group activities but still able to hear spoken utterances. Each child was observed on at least two separate occasions for 15 minutes in both structured and unstructured settings (totaling 30 minutes of structured and 30 minutes of unstructured time). Teacher and peer verbal behaviors were recorded when they were directed at either the subject or the entire group in which the subject was a member.

Each behavior was recorded in sequential order for 50 seconds of each minute, and the final 10 seconds were used as "catch up" time. Stopwatches were used to keep track of the minutes. If the subject left the group, the observation was discontinued until the child returned, and the timing resumed from the point it had been stopped.

The third type of data analysis included each child's stanine scores on the Metropolitan Achievement Test given in April. These scores were included to see if there was any correlation between the scores and the teacher ratings of the good and poor communicators. Stanine scores from the following areas were included: auditory, visual, language, pre-reading, and quantitative.

Reliability

Interobserver reliability was calculated by having a second observer make simultaneous, but independent, observations with each observer. Two reliability observations were taken with two observers and three were taken with the third observer, totaling seven.

Two types of reliability measures were calculated. Overall measurement of reliability of the number of simple occurrences of coded behaviors was calculated by the formula:

$$\text{Reliability} - \frac{\text{number of agreements of occurrence}}{\text{number of agreements + number of disagreements of occurrence}} \text{ X } 100$$

A second reliability measure was calculated on the categorical agreement of the utterance, or how each utterance was coded. The formula used was:

$$\text{Reliability} - \frac{\text{number of agreements on all categories}}{\text{number of agreements + disagreements on all categories}} \text{ X } 100$$

Overall code reliability was 87%.

Results

The DSS analysis significantly distinguished the good from the poor communicators. The Metropolitan distinguished the poor group either from the good group or both the good and control group on the following dimensions: auditory discrimination, visual discrimination, language, reading readiness, and quantitative skills. These results are summarized in Table 12. Teachers clearly distinguished the good communicators from the poor communicators on several dimensions: makes verbal requests, follows instructions, responds appropriately to questions, uses complex sentence structure, length of attention span, reading readiness, use of complete sentences, and speaks clearly. Of these, the DSS or Metro data strongly supported these discriminations: uses complex sentences and reading readiness. Strong support was not obtained for the other distinctions made by the teachers based on behavioral observations of the subjects in classroom interactions with peers and teachers. The teacher questionnaire data are summarized in Table 13.

Insert Table 12 about here

Insert Table 13 about here

Discussion

The results suggest that the greatest differences between good and poor communicators lie along linguistic and cognitive dimensions. Social differences in terms of the language usage of the subjects may exist, but did not significantly distinguish the subjects in this study. These results suggest that language remediation efforts should focus most heavily on the structural aspects of communication and relative cognitive and perceptual skills with children demonstrating below average communication skills in the absence of more general handicapping conditions.

OBJECTIVE 3: To develop auxiliary language training procedures to teach specific skills typically required in school settings.

The results of our research on the first two objectives and our own research as part of this objective has suggested to us that "milieu" language teaching strategies may be the most cost effective approach for supplementing traditional language intervention. This approach has been shown to have a large impact on both the linguistic and social aspects of children's communicative behavior. Furthermore, it can be implemented by both parents and teachers under the supervision of a therapist or trainer. Milieu strategies are basically a set of techniques to be used incidentally with a child throughout the day,

Table 12

Significant Results

	Means		
Variable	Good Communicators	Controls	Poor Communicators
DSS Score	8.05*	7.28	6.16*
Auditory - Met.	6.5 *	7.3*	3.4*
Visual - Met.	6.2	7.4*	4.5*
Language - Met.	6.5*	6.8*	3.9*
Reading - Met.	6.5*	7.8*	3.7*
Quant. - Met.	6.45	7.9*	4.3*

* = Significant differences between poor communicators and other groups with asterisks. Results obtained utilizing a "Tukey B" test of means.

Table 13

Teacher Questionnaire Results

		Top Third	Middle	Bottom Third
1) Attention Span	High	12	1	0
	Low	1	1	11
	Control	9	4	0
2) Reading Readiness	High	13	0	0
	Low	0	1	12
	Control	7	5	1

		Always	Usually	Sometimes	Hardly Ever	Never
3) Disruptive during Structured Times	High	1	0	1	6	5
	Low	0	3	4	3	3
	Control	0	0	6	4	3
4) Uses Complete Sentences	High	8	4	0	0	0
	Low	0	1	8	3	1
	Control	4	8	1	0	0
5) Speaks Clearly	High	10	2	1	0	0
	Low	0	1	8	3	1
	Control	5	6	2	0	0
6) Modulates Voice Volume According to Situation	High	7	6	0	0	0
	Low	0	3	4	6	0
	Control	2	7	3	1	0
7) Uses Simple Sentences	High*	3	2	1	4	1
	Low*	1	8	3	0	0
	Control	0	6	5	2	0

Table 13 cont.

		Always	Usually	Sometimes	Hardly Ever	Never
8) Makes Verbal Requests to Meet Needs	High	12	1	0	0	0
	Low	0	6	7		0
	Control	9	4	0	0	0
9) Follows Instructions Accurately	High	6	6	1	0	0
	Low	0	2	4	7	0
	Control	4	6	3	0	0
10) Responds Appropriate to Questions	High	8	4	1	0	0
	Low	0	2	9	1	0
	Control	4	7	2	0	0
11) Sticks to Subject of Conversation	High	5	8	0	0	0
	Low	0	5	6	2	0
	Control	4	5	4	0	0
12) Uses Complex Sentence Structures	High	4	8	0	1	0
	Low	0	0	0	8	5
	Control*	0	7	4	1	0
13) Disruptive During Play Times	High	0	1	2	7	3
	Low	0	1	6	2	4
	Control	0	0	5	4	4
14) Spends most Unstructured Time Talking to Peers	High	1	6	6	0	0
	Low	1	1	7	4	0
	Control	1	7	4	0	0

*Total does not equal 13 because teacher forgot to complete.

both at home and school. They can be targeted on a wide range of linguistic and social skills. The techniques include incidental teaching, time delay, and the mand-model procedure. Most of the re-research by us and others (principally Betty Hart, Todd Risley, and Jim Halle—all of whom we have had a great deal of interaction with throughout the course of this research) has been classroom-based so far.

In this section we will present the results of four studies which, combined with results of our research for Objectives 1 and 2, have led us to conclude that a milieu teaching strategy approach is the most cost effective route. Two of these studies suggest the relative ineffectiveness of two other approaches, direct social skill instruction and reverse mainstreaming. The other two studies examined the effectiveness of milieu training approaches. One of these utilized classroom trainers and the other parents. The results of all four studies are presented below.

Teacher and Normal Peer Interaction with Language-Delayed Preschool Children

The topic of mainstreaming has become a focal one among educators of handicapped children during the past several years. A primary assumption of the mainstreaming movement is that the handicapped child will benefit from observing and interacting with normal children in the mainstreamed classroom. Although research has been increasing, the bases for mainstreaming have relied more on theoretical assumptions than on empirical research. The purpose of this study was to investigate some questions concerning the effects of mainstreaming on the productive verbal behavior of language-delayed preschool children and their non-handicapped peers in a mainstreamed classroom. We were specifically interested in the following questions:

1) How do normal and language-delayed preschool children compare in terms of their respective verbalization rates, their rates of spontaneous speech initiation, and their responsiveness to questions from peers and teachers?
2) How do teachers respond to the two types of children in terms of their rates of instructions, questions, and total verbalizations?
3) How do normal child models compare to other normal children not in a mainstreamed classroom in terms of their relative ratios of peer-to-teacher interaction?

These questions were investigated in a study of 10 language-delayed preschool children who were mainstreamed in a classroom with five normal models. Five normal children from a regular non-mainstreamed classroom were also observed in order to contrast the behavior of the normals in the mainstreamed classroom to normals in a traditional classroom. All 20 children were matched for age with a mean of 3 yr, 10 months. The language-delayed children all showed up on a battery of standardized language assessments as having speech delays averaging about 1 yr below their age levels. All 20 were observed for 10

15-min periods across 3 months. The observations were taken while the children were involved in a freeplay period with a teacher-pupil ratio of 1 to 5. The observation code measured child verbalizations to peers and teachers with a sub-category for spontaneous initiations and verbal responses to questions (non-prompted) and also measured questions, instructions, and total verbalizations by the teachers in both the mainstreaming classroom and the traditional classroom.

Not surprisingly, the normal models in the mainstreamed classroom displayed much higher rates of spontaneous initiations and total verbalizations than the language-delayed children as shown in Figure 13.

Insert Figure 13 about here

The language-delayed children also responded to questions from their teachers at a much lower percentage of time compared to their normal peer models (i.e., less responsive in obligatory speech situations) as shown in Figure 14. However, rates of teacher verbalizations to both types of children in the mainstreamed classroom were very similar in terms of their total verbalizations, questions, and

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Insert Figure 14 about here
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instructions to each group. Further, these rates were very similar to the rates displayed by teachers in the normal children's classroom. Also, the normal children in the traditional classroom displayed rates of verbal behavior very similar to the rates dispalyed by the normal models in the mainstreaming classroom. But an important difference *was* found between the verbal behavior of the mainstream models and their counterparts in the traditional classroom. This difference is displayed in Figure 15. It shows that the normal children from the traditional classroom directed a far greater percentage of tr

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Insert Figure 15 about here
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their total verbalizations to their peers than did the language delayed or normal children in the mainstreaming classroom. The children in the mainstreaming classroom interacted much more with their teachers than with each other compared to the children in the normal classroom during the freeplay periods observed.

The mainstreaming model examined here has been characterized by educators as "reverse mainstreaming...." the presence of normal children in a classroom primarily made up of handicapped children. Contrary to the hopes and expectations of advocates of this model, it may have some effects in reverse of those intended, however. The assumption that normal children serve as important models for

Figure 13

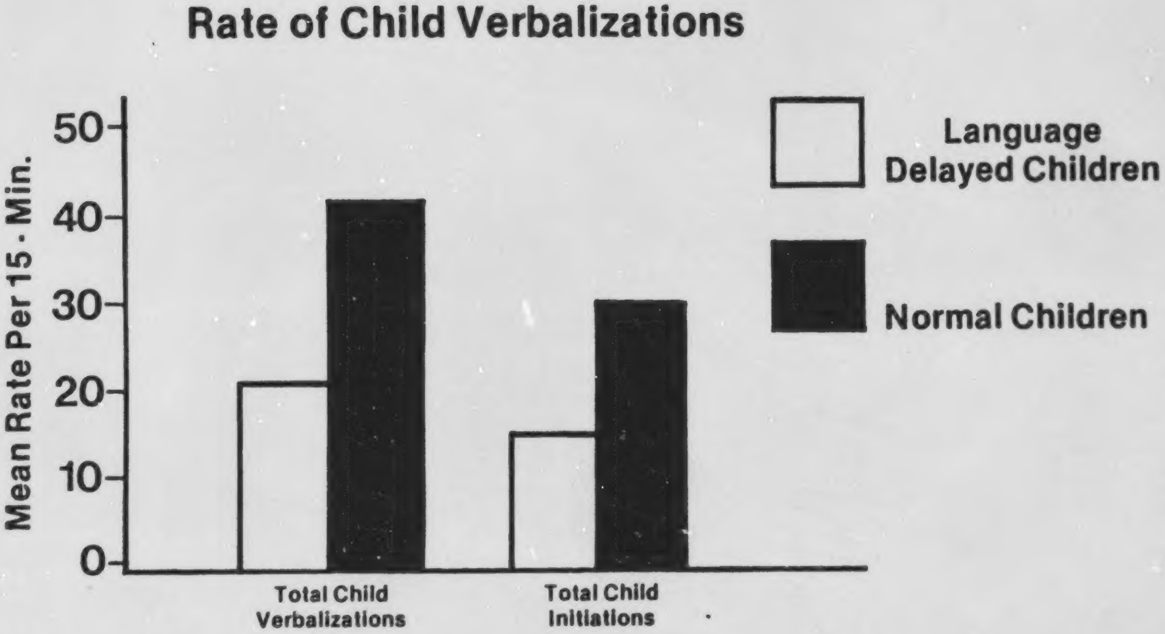
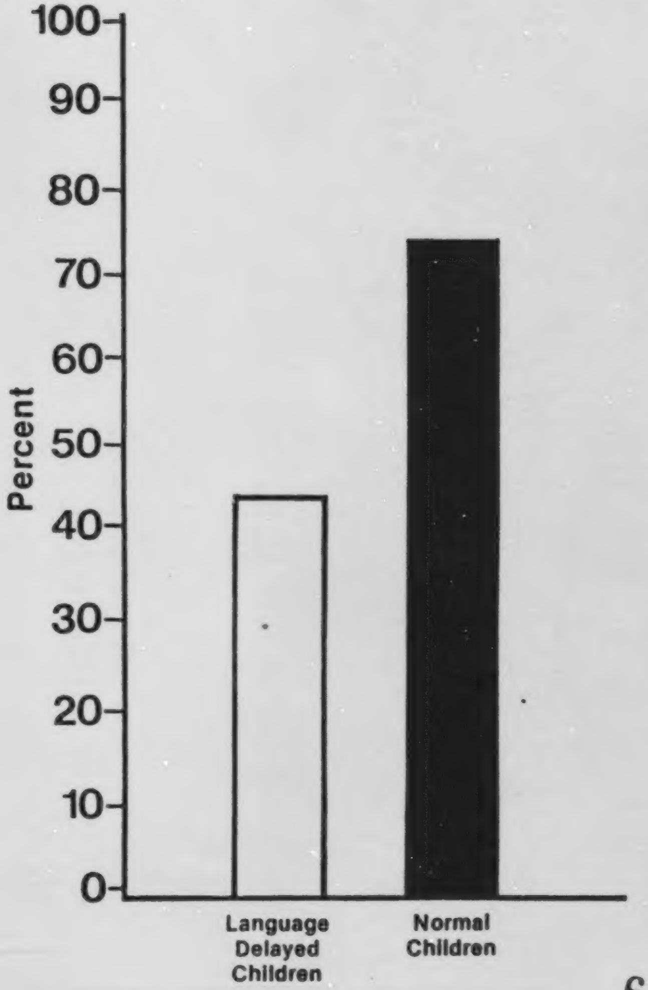
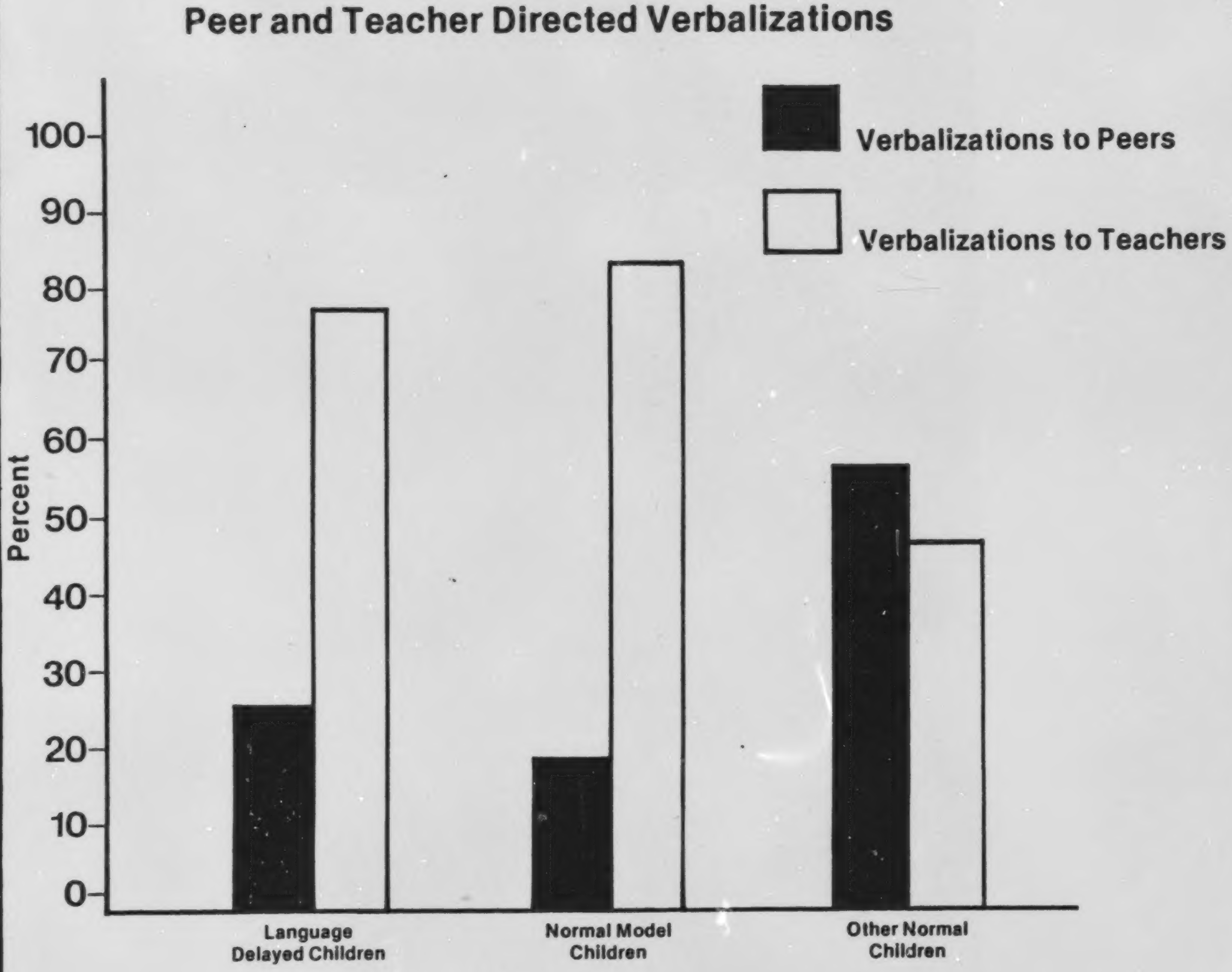

Rate of Child Verbalizations
Mean Rate Per 15 - Min.
50
40
30
20
10
0
Total Child Verbalizations
Total Child Initiations
Language Delayed Children
Normal Children

Figure 14



Percent Responsive to Questions

Figure 15


Peer and Teacher Directed Verbalizations
Verbalizations to Peers
Verbalizations to Teachers
Percent
100
90
80
70
60
50
40
30
20
10
0
Language Delayed Children
Normal Model Children
Other Normal Children

handicapped children is suspect when social interaction between the two is infrequent. In this study the normal models talked primarily to the teachers and relatively infrequently to their handicapped peers. A further analysis of the data revealed they directed a disproportionate amount of what peer interactions they made to each other, thus forming what in some ways amounted to a separate sub-group within the class. Thus, their true therapeutic function remains to be established. Further research on the effects of different ratios of handicapped to nonhandicapped children and the effects of different characteristics of the groups remain to be done since these effects may be typical of only this specific mainstreaming model and the population characteristics of these subjects. Nevertheless, these differences support arguments that have posited speech rates to be a primary predictor of delay and also those which have suggested that rate of social interaction should be a primary treatment target in comprehensive language training efforts.

The Effects of Social Skill Training on the Social Interaction Behavior of Language-Delayed Preschoolers.

An experimental attempt was made to train specific social skills to four language-delayed preschool children. An observational code was utilized to measure a number of child and teacher behaviors. A copy of this code was included in the February 1981 progress report. In the following summary we will be presenting data on the rate of invitations to joint activity to peers, the percent of intervals in which each child engaged in cooperative play, questions and comments to peers, overall utterances to the teacher, and overall utterances to peers. These represent the critical subset of behaviors measured by the code.

Generally, the four children involved in the study had been found to have depressed rates of social behavior corresponding to their delayed speech. We attempted to teach a joint-activity game to each subject within a multiple-baseline design with a reversal condition included. The experimental conditions were: baseline, joint-activity game, joint-activity game with teacher prompts, reversal, and joint-activity game with prompts again. Within the context of the game format, invitations to joint activity were trained with a common communication game format. That format was as follows: The four subjects are divided into two play groups with two other peers in each group (4 children per group). These play groups meet daily for 8 minutes and played with a common manipulative material (e.g., blocks, lego, etc.). During the first 4 minutes, one target subject and one peer played the communication game with a teacher. At this time the teacher instructed them in the target behavior in the context of the game. At the end of 4 minutes the game is stopped. All four children were then free to play with the materials in anyway they wished for the remaining 4 minutes. This period allowed an analysis of generalization. In addition, sometimes the group met with an unfamiliar teacher supervising to further facilitate an analysis of generalization. The subjects became very proficient at the game during the initial 4-minute period.

The results of this study revealed no generalization of the invitations to joint activity occurred outside the game time until teacher prompts were given. In this condition, clear effects occurred for three of four subjects and minor effects for the fourth (i.e., Darrell). Reversal control showing the efficacy of the prompts were obtained for three of four subjects also (all except Rick). In other words, generalization of the invitations to joint activity to peers were dependent on teacher prompts in the freeplay period immediately following the 4-minute game playing time. However, clear effects of the game with prompts in the generalization setting were seen in terms of the cooperative play behavior of all four subjects. No interpretable or clear effects were obtained for any subject in terms of their questions and comments to peers, utterances to teacher, or utterances to peers in the generalization setting immediately following the game.

This study demonstrated that we could get generalization of invitations to joint activity and cooperative play interactions by language-delayed preschoolers in a freeplay situation, but only if we used teacher prompts for the behavior in the generalization setting. In our opinion, this finding does not support this approach as an especially strong technique for facilitating peer interaction. On the other hand, finding ways to really increase peer interaction among preschool children has proven to be an exceptionally difficult task. Many researchers have attempted it, and almost no wholly satisfactory techniques have been reported. At the minimum, this study demonstrated a technique that will work if teacher prompts in the generalization setting are included. And teacher prompts certainly represent a relatively mild low-cost effort. Also, the target behavior, invitations to joint activity, is clearly a cornerstone to the development of good social-interactive behavior. Therefore, this technique is probably worth utilizing. On the other hand, other approaches might be more cost-effective, particularly those that can be individually designed to meet the needs of each child.

The Effects of Teacher Mands and Models on the Speech of Unresponsive Language-Delayed Children.

A number of research studies have investigated the effects of "in vivo" or "incidental teaching" approaches to language remediation (Hart & Risley, 1980). In contrast to traditional speech therapy models, these procedures are applied in the child's everyday environments and can be utilized by teachers, parents, and other adults. Hart and Risley (1968, 1975, 1980) have published a number of studies reporting positive outcomes of incidental teaching on the productive language usage of socio-economically disadvantaged preschool children. In these studies, incidental teaching procedures were used whenever a child initiated (verbally or nonverbally) an interaction by specifying a reinforcer (attention, access to a material or activity) that an adult could deliver. Prior to delivering the reinforcer, the adult focused attention on the child and asked for elaborated language related to the topic the child specified. In this way, the adult required specific language forms or functions from the child, and taught simple or elaborated language under highly functional and reinforcing conditions. Utilizing this approach, Hart and Risley have reported success teaching the functional usage of color noun combinations, nouns, compound sentences, descriptions of materials (adjectives), as well as in increasing overall language use beyond the specific language behavior targeted (Hart & Risley, 1980).

Hart and Risley (1980) have argued that differentially attending to the child's initiations and responding relative to the child's selected topic substantially increased their subjects' probability of talking. This in turn appeared to facilitate the unanticipated general effects they reported as a result of incidental teaching. A significant variation of the incidental teaching approach was recently reported by us (Rogers-Warren & Warren, 1980). Working with language-delayed children who were concurrently receiving traditional one-to-one language training, we instructed classroom teachers to approach children and request verbal behavior through the use of mands (instructions to verbalize) and models (imitative prompts). Thus, the number as well as the efficacy of teaching opportunities was controlled by the teacher. This approach violated one basis of incidental teaching—the determination of topic (reinforcer) and initiation of the interaction by the child. However, it allowed a teacher to apply the other components of incidental teaching with children who had very low initiation rates and who were unlikely to encounter the child-inititated incidental teaching procedures. The results of the study showed increased subject verbalization rates, increased responsiveness in obligatory speech situations, and increased generalization from one-to-one language training to the classroom. These findings suggest the mand-model procedure could have many of the same effects as incidental teaching and more importantly, be applicable with socially isolate children. But we did not investigate the effects of the procedure on the subject's non-obligatory speech (initiations), the effects of withdrawing the procedure, or generalization of the effects to other settings.

Since adults control the number and efficacy of teaching opportunities in the mand-model procedure, it seems plausible the procedure would mitigate against increases in child initiation rates. When treatment is withdrawn, the subjects might return to low rates of interaction and again become unresponsive to the speech of others. It is conceivable that the procedure might have no effect on the verbal behavior of the subjects under nonobligatory speech conditions, or in another setting altogether. Therefore, in the present study the rates of nonobligatory speech (verbalizations not preceded by adult or peer speech to the subject) and the responsiveness of the subjects to initiations from others during a freeplay period were directly measured as outcomes of a "mand-model" procedure implemented in a multiple-baseline design across three unresponsive, socially isolate language-delayed preschool children. Both the subjects and the teachers were frequently observed in a second freeplay setting to determine the extent of generalization resulting from the intervention. The effects of requiring two different minimum sentence response lengths from the subjects on the mean lengths of their speech utterances were also measured.

After an initial baseline period, teachers were instructed to 1) present approximately 10 mands per 15 minutes to each target child; 2) provide models when subjects failed to respond appropriately to the mands; 3) provide feedback for appropriate child responses to mands and models during the initial classroom freeplay period of the day. Generalization of the intervention effects was measured during a second freeplay period held later in the day. Following a lengthy intervention condition, experimental procedures were systematically faded out. Results of the experiment are shown in Tables 14 and 15 and Figures 16, 17, and 18.

Insert Tables 14 and 15 and Figures 16, 17, and 18 about here

Experimental control was demonstrated over the target teacher behaviors, mands and models, throughout the experiment. Rates of mands and models were dramatically increased, held relatively constant across the intervention phase, and then gradually decreased to baseline levels (or near baseline levels in Lisa's case) during the programmed fading condition. Large increases in total teacher verbalizations also occurred with the implementation of the intervention and these rates maintained during the fadeout condition. These rates reflected an unscheduled increase in teacher questions as well as the planned increases in mands and models. Furthermore the maintenance of total teacher verbalizations appeared largely attributable to further increases in teacher question rates during the fadeout condition.

Significant increases in total child verbalizations occurred during the implementation of the intervention, generalized to the second freeplay setting, and maintained throughout the experiment. Increases in the subjects' non-obligatory speech responses (initiations) also occurred although the effects were somewhat limited for Lisa. Generalization and maintenance of these effects were also observed in the second freeplay setting. Lisa and Debra both became much more responsive in obligatory speech situations as soon as the intervention was initiated. This effect generalized and continued throughout the experiment. Tom, who was already relatively responsive in baseline, became somewhat more responsive in the intervention setting throughout the experiment but displayed no generalization.

A primary experimental question concerned the effects of the fading condition. As the mand-model procedure was faded out, Tom and Debra actually became more verbal in the intervention setting and marked increases occurred in their rates of non-obligatory verbalizations in this setting. The treatment effects maintained for Lisa but no increases occurred. However, the fadeout also revealed an interesting effect with the teachers. They maintained their overall interaction rates with the subjects in the intervention setting during this period essentially by increasing their rates of questions even further. That is, when told to decrease their use of mands and models, they complied by making a topographical shift from the mand forms to the question form. This raises an interesting issue about

Table 14

Generalization Setting

Means per Observation

	Baseline	Intervention	Fadeout
Subject: Tom			
Child Verbalizations	12.0	24.6	22.2
Non-Obligatory Verbalizations	5.7	16.9	15.9
Responsiveness	56%	53%	55%
Teacher Questions	8.6	11.9	7.9
Teacher Verbalizations	13.3	14.9	11.0
Subject: Lisa			
Child Verbalizations	4.2	11.4	9.2
Non-Obligatory Verbalizations	1.0	6.0	5.5
Responsiveness	15%	32%	33%
Teacher Questions	8.5	13.4	11.8
Teacher Verbalizations	12.0	16.8	12.5
Subject: Debra			
Child Verbalizations	10.7	19.6	14.5
Non-Obligatory Verbalizations	9.5	12.8	11.5
Responsiveness	24%	48%	63%
Teacher Questions	5.8	9.6	3.0
Teacher Verbalizations	7.5	13.0	16.0

Table 15

MLU Averages

Subject	Baseline	Intervention B_1	Intervention B_2	Fadeout
Tom	1.1	1.2	1.6	2.0
Lisa	2.0	1.9	2.2	2.4
Debra	1.4	1.4	1.9	2.1

Figure 16

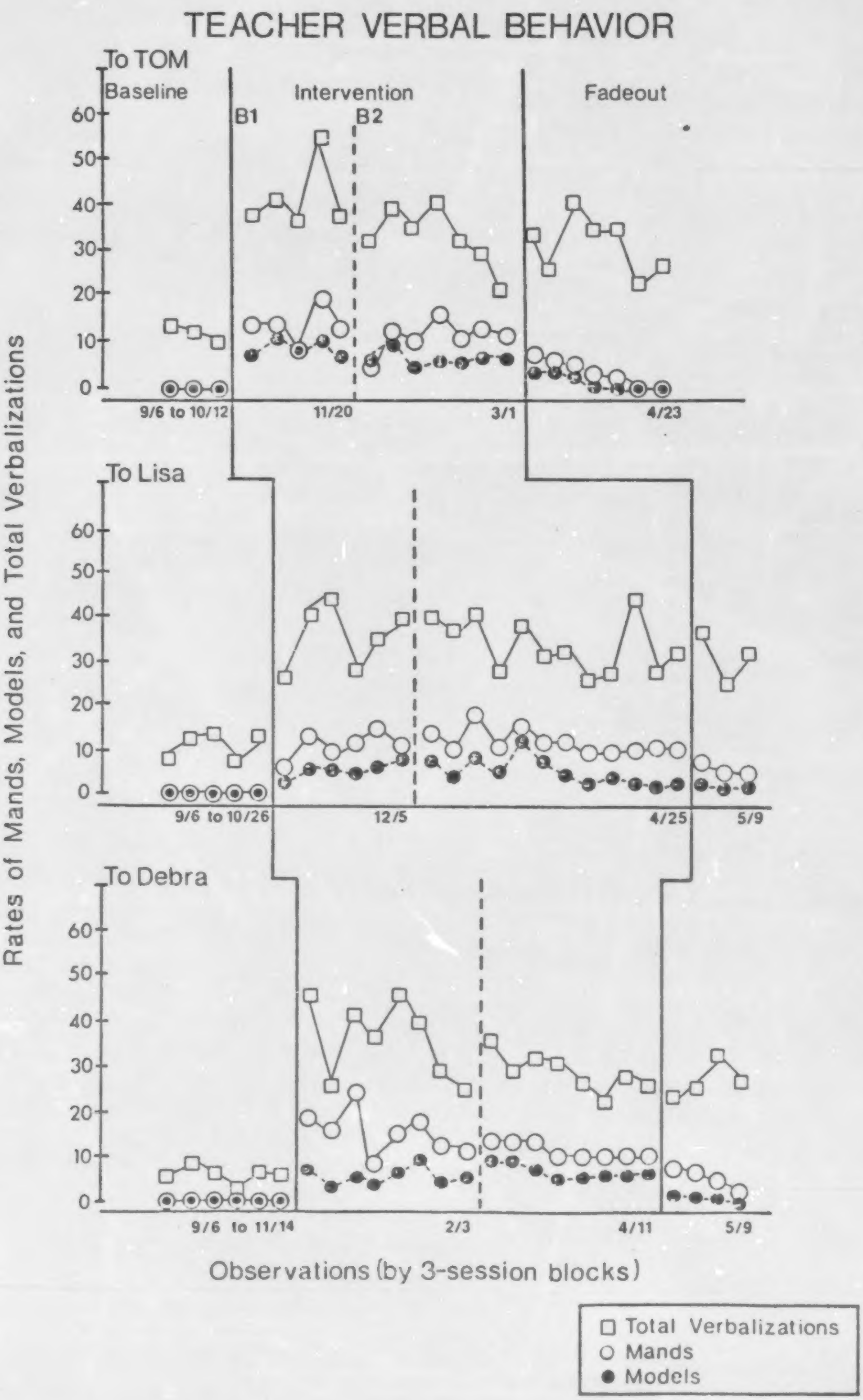
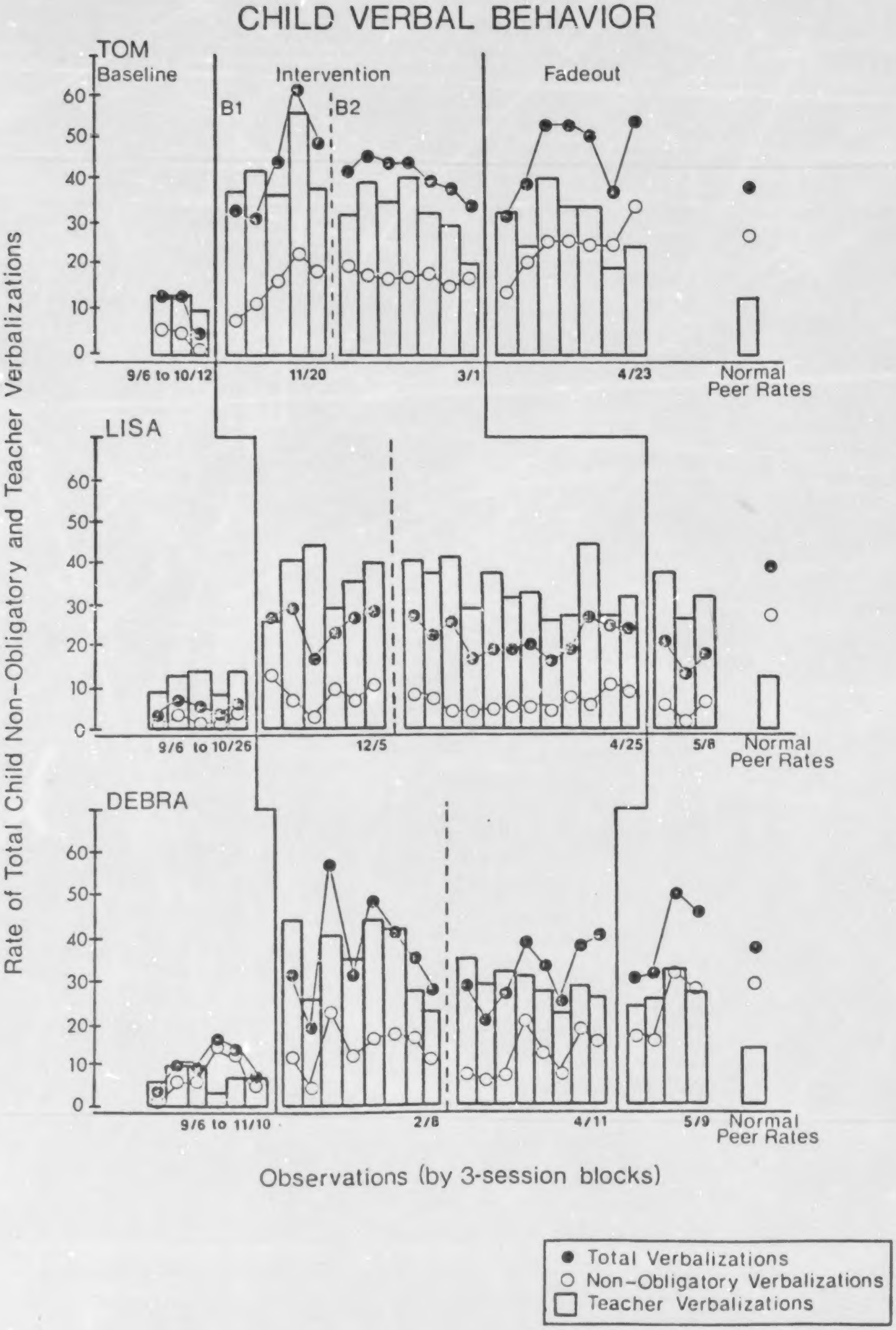
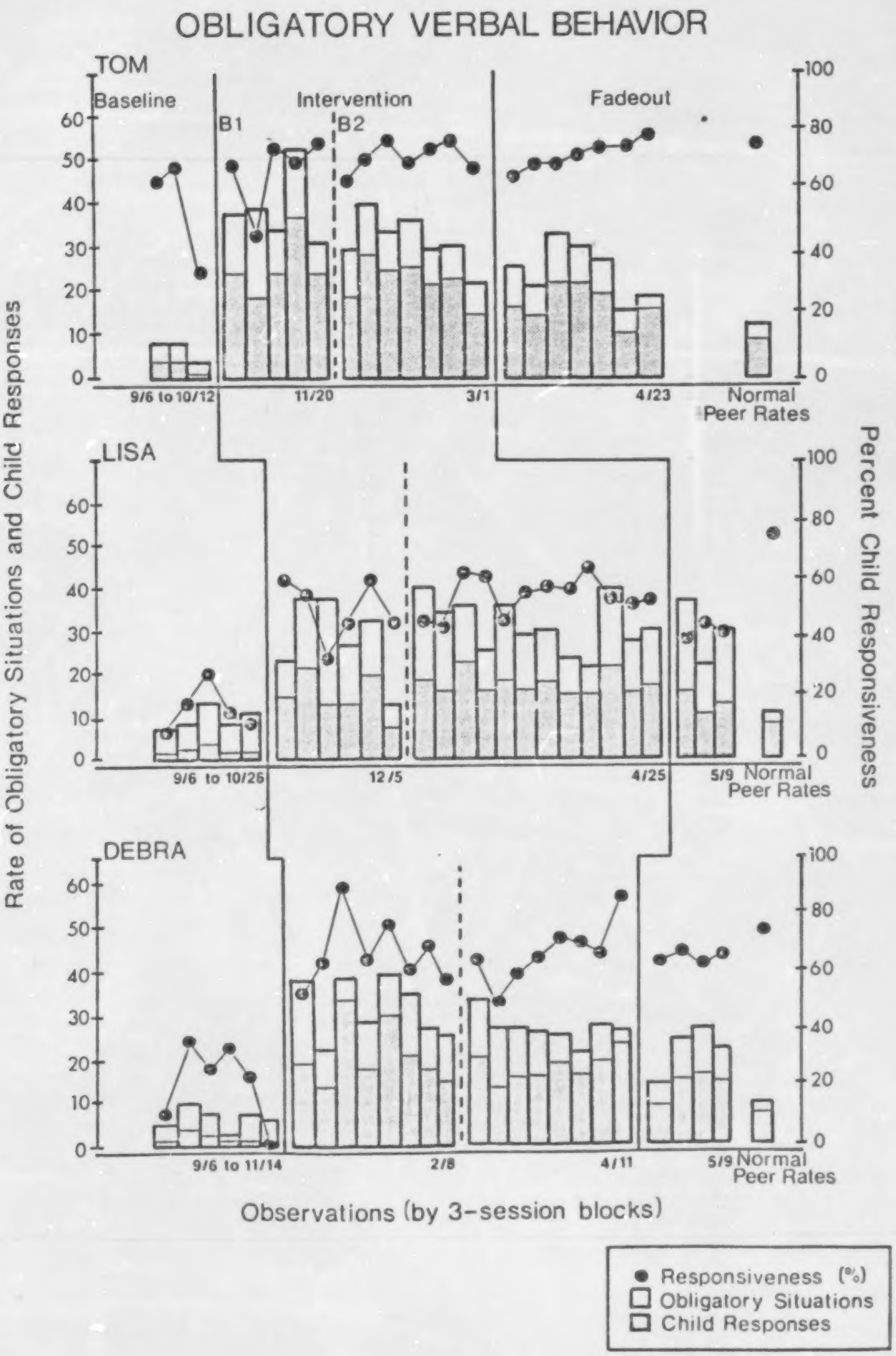

TEACHER VERBAL BEHAVIOR
To TOM
Baseline
Intervention
Fadeout
B1
B2
60
50
40
30
20
10
0
9/6 to 10/12
11/20
3/1
4/23
To Lisa
9/6 to 10/26
12/5
4/25
5/9
To Debra
9/6 to 11/14
2/3
4/11
5/9
Rates of Mands, Models, and Total Verbalizations
Observations (by 3-session blocks)
□ Total Verbalizations
○ Mands
● Models

Figure 17


CHILD VERBAL BEHAVIOR
TOM
Baseline
Intervention
B1
B2
Fadeout
0
10
20
30
40
50
60
9/6 to 10/12
11/20
3/1
4/23
Normal Peer Rates
LISA
9/6 to 10/26
12/5
4/25
5/8
Normal Peer Rates
DEBRA
9/6 to 11/10
2/8
4/11
5/9
Normal Peer Rates
Rate of Total Child Non-Obligatory and Teacher Verbalizations
Observations (by 3-session blocks)
● Total Verbalizations
○ Non-Obligatory Verbalizations
□ Teacher Verbalizations


OBLIGATORY VERBAL BEHAVIOR
TOM
Baseline
Intervention
B1
B2
Fadeout
9/6 to 10/12
11/20
3/1
4/23
Normal Peer Rates
LISA
9/6 to 10/26
12/5
4/25
5/9
Normal Peer Rates
DEBRA
9/6 to 11/14
2/8
4/11
5/9
Normal Peer Rates
0
10
20
30
40
50
60
0
20
40
60
80
100
Rate of Obligatory Situations and Child Responses
Percent Child Responsiveness
Observations (by 3-session blocks)
● Responsiveness (%)
☐ Obligatory Situations
▨ Child Responses

the efficacy of the questions. Could the same results be obtained just be increasing rates of teacher questions?

Like incidental teaching, the mand-model procedure both focuses the attention of the teacher on the child and gives the teacher a strategy to elicit and shape the child's speech. The effects of mands, models, and questions is to demand speech from the child. The difference between these forms is a matter of directness. Models are most explicit in that they actually provide the child with the response. Mands are next because of their imperative "command" nature. Question forms are least explicit because they are often ambiguously presented in terms of appropriate child response and inherently less directive than mands and models. But they are also a much more normal conversational form while mands and models may seem somewhat unusual in normal adult-child conversation. This "demand continuum" reflects itself in child responsiveness. As reported, models are most frequently responded to (72%), then mands (66%), and then questions (51%).

When utilizing the mand-model procedure it is not surprising that teachers would also ask more questions because (1) their attention has been focused on the child, and (2) questions are not too different in form and function from mands and models. But when told to stop using the mand-model procedure the teachers did not reduce their interaction rates with the subjects but simply increased questions even more. Given the increased rates of questions, what were the independent effects of the mands and models? The main effect was probably on the responsiveness of the subjects. During baseline, when no mands and models were given but questions were (mean rate of 7.5 per observation), Lisa was responsive to only 15% and Debra to 24%. So the explicit imperative nature of the mand-model procedure probably made the subjects more responsive. Once their responsiveness reached near normal levels then it would appear, on the basis of the fadeout data, that questions were sufficient to maintain responsiveness and high interaction rates between teachers and children. Nevertheless, a component analysis in which just teacher question rates are first increased may be warranted in a future study.

A concern of the investigators prior to the experiment was that the mand-model procedure could make a child verbally responsive but not verbally initiative because it is adult controlled in contrast to incidental teaching. Given that the subjects were socially isolate such an effect might represent a severe limitation on the therapeutic potential of the procedure. This did not prove to be the case. Tom and Debra's non-obligatory verbalization rate in the intervention setting increased over baseline and then increased further in correspondence with the fadeout condition to levels similar to their normal peers. Some increases also occurred for Lisa during the intervention but her fadeout levels dropped slightly to a level still above her baseline. The intervention effects generalized and maintained for Debra and Lisa, but not for Tom.

The intervention setting and generalization data suggest the mand-model procedure stimulated the "response class of language" in general (Hart & Risley, 1980) and thus, like incidental teaching, produced some general effects on language usage. These results along with those of Hart and Risley (1968, 1975, 1980), and Halle, Marshall, and Spradlin (1979) suggest that it doesn't necessarily matter how children's rates of interaction is increased (i.e., by incidental teaching, mand-model, or time-delay), because once it is, general and often unanticipated changes in language use will occur.

Despite its positive effects, the results of the fadeout suggest the procedure should be faded out and perhaps replaced by an incidental teaching format (i.e., child initiated) once the child is responsive and talking at an acceptable rate. The evidence for this is the increases in total verbalizations and non-obligatory verbalizations displayed by Tom and Debra in the intervention setting corresponding with the fading procedure. These suggest that the adult-initiated format of the mand-model procedure might tend to place a ceiling level on verbalization rates. Another factor to be considered is that the procedure does not represent a typical way of interaction, which may mitigate against its effectiveness after initial positive effects have been realized. However, the experimenters would recommend that the procedure not be withdrawn until substantial stable effects are evident (near normal child levels if possible) and some across-setting generalization has been obtained. Furthermore, the fading procedure should proceed on the basis of evidence of maintenance, not by a predetermined schedule.

The MLU data are intriguing also. MLU is widely considered as a valid indicator of the complexity of young children's speech (Dale, 1976; Moerk, 1977). Changes of .5 are usually considered to represent important developmental advances by the child (Brown, 1973). There was little or no increase in any subject's MLU until the two-word response requirement (B_2) was added to the intervention. Then, for the remainder of the intervention condition Tom's MLU increased .4 (over 12 weeks), Debra's .5 (over 8 weeks) and Lisa's .3 (over 16 weeks). Furthermore, subject's MLUs continued to increase during the fading condition so that by the end Tom's MLU had increased .8, Debra's .7, and Lisa's .5. Were these increases the result of the intervention and the increased sentence length requirement or simply maturational bursts? It is not possible to determine the answer from this study. However, these data parallel data on the general effects of incidental teaching that Hart and Risley (1980) have reported. At the minimum, these findings suggest the need for studies in which different minimum word length utterances are required in response to mands with a design that allows for valid control group comparisons.

The mand-model procedure was designed as an alternative to the Hart and Risley incidental teaching procedure for use with children who are socially isolate or low rate speech initiators, which is a common problem among more severely language delayed or mentally retarded children (Schiefelbusch, 1981). Previous research (Rogers-Warren & Warren, 1980) has shown the procedure increased child verbalization, responsiveness, speech complexity, and generalization of newly trained language. The present study replicated many of these effects and presents new data on teacher question rates, the child's non-obligatory speech, and differential responsiveness. Furthermore, data indicating the across-setting generalization and maintenance of child verbalizations, non-obligatory speech, responsiveness, and teacher verbalizations and question rates was presented. Finally, data on changes in child MLU and data demonstrating that the procedure can be successfully faded out with durable results were shown. The sum of this data suggests the mand-model technique facilitates many of the specific and general effects also reported to result from incidental teaching. It is suggested that it be used as a means of establishing initial stable rates of child speech and responsiveness and that the locus of control then be shifted from the adult to the child as in the incidental teaching model.

Training Parents to be Incidental Language Trainers

In reviewing the relevant literature we noted a consensus among professionals that parent language intervention is critical for improving generalized language skills in handicapped children. Far less agreement existed, however, concerning cost-efficient and effective methods for training parents, the content of training or procedures for quantifying changes in parents and child behavior.

In considering what strategies to train parents to use, our attention was drawn to the experimental literature on incidental teaching strategies. In these studies, incidental teaching had been applied by trained teachers and staff members. Extension of incidental procedures for use by parents seemed appropriate for several reasons. Three procedures had been specified sufficiently to be adapted easily for use by parents. They included: (1) Incidental Teaching, which had been developed and empirically validated in several studies by Hart and Risley (1968, 1974, 1975, 1980); (2) the Mand-Model Procedure, described and studied by Rogers-Warren and Warren (1980); and (3) Time Delay, which had been examined in two studies by Halle and his colleagues (1979, 1981).

A primary reason supporting the use of incidental teaching procedures by parents is that the procedures can be applied in naturally occurring situations. If parents are trained to view most any situation as a potential language activity, they can apply the procedures whenever they have the inclination and time to do so. Furthermore, by teaching parents to use the procedures in a variety of situations and in a variety of settings, generalization can be actively programmed.

A second reason supporting the use of incidental teaching procedures by parents is that the procedures focus on teaching children about the functions of language. Traditional language training, conducted by the speech clinician in a therapy setting removed from the natural environment, has typically focused on teaching syntax or the structure of language. Oftentimes the content being trained, as well as the functions trained were not easily generalized to non-training settings. In addition, traditional language therapy often utilized discrete trial training in which the child was taught to respond to specific stimuli presented by the clinician. In contrast to traditional language therapy, incidental teaching places primary emphasis on teaching the functional use of language. And, as the child's ability to use language functionally improves, increasingly more sophisticated means of expressing those functions are trained. Generalization of child skills is actively programmed by teaching the functions of language in a vareity of situations and settings.

A third reason for use of incidental teaching by parents is that the procedures focus on building conversation skills. Whereas traditional language therapy trained responding to individual and oftentimes, unrelated stimuli, incidental teaching procedures are designed to build conversational skills, including: initiating language in addition to responding to verbal or nonverbal stimuli; turntaking; establishing joint attention prior to initiating language; training elaborated language about particular topics; and increasing length of conversation about particular topics.

This study involved six mothers and their language-delayed preschoolers. In a multiple-baseline design across dyads, mothers were taught to use four incidental teaching techniques. The purpose of the study was to evaluate mothers' abilities to correctly apply the techniques and also to assess the effects of the techniques on child language.

Arranging the environment. Before training mothers to use the procedures, they were trained to arrange the environment to facilitate talking by their children. This sequence of training was followed because the mother's ability to arrange and control materials in the environment is critical to her ability to effectively apply the procedures. During training in environmental arrangement, mothers learned to program for successful teaching interactions by selecting activities that are appropriate for the child's interests and skill level. Mothers were also trained to select activities that are conducive to use of the training procedures. Activities that are conducive to use of the procedures are those involving materials which can be manipulated by the child and which have a variety of attributes that can be discussed. Mothers were also trained to increase requesting behavior by the child by arranging materials in the environment so that they are visible to the child but out of his or her reach, and by adjusting materials such that the child would need to request help to open them, attain them, work them, and so on. Mothers also learned to control materials so that only those items being used at the moment are available to the child. Other materials are removed so that they won't distract the child from the task at hand. Finally, mothers were taught to withhold parts of materials from the child while eliciting language, and then to immediately give the material to the child contingent upon language responses.

The incidental teaching techniques. The four incidental teaching techniques which the mothers learned were: (1) the Model Procedure, (2) the Mand-Model Procedure, (3) the Delay Procedure, and (4) the Incidental Teaching Procedure. The techniques were trained in the order specified above for two reasons. First, the child-goals of each technique facilitated teaching the child-goals of the next-trained technique. Second, the steps of each procedure are cumulative. For example, learning the steps in the Model Procedure would facilitate learning the slightly more complex steps in the Mand-Model Procedure. The decision to train all four procedures was made because each technique targets different language goals for the child. In addition, the techniques are differentially more suitable in different situations. By training several techniques, parents can choose which is the most appropriate to use in particular situations. And finally, the variety of stimuli to which a child may linguistically respond may be increased by training parents to use several different techniques.

The first procedure trained was the Model Procedure. The Model Procedure is the simplest of the four techniques, and the other techniques build upon it. The decision to train mothers to use the Model Procedure was based on the underlying theme of using the techniques to program for success by the child. Use of open-ended mands such as "What are you building?" or "What is it called?", will probably result in failure for children with limited expressive vocabularies. The Model Procedure programs for success, however, by providing the response for the child to imitate. If, after two models, the child does not give the correct response, corrective feedback is given and the interaction continues. In order to prevent teaching interactions from being aversive to the child, the Model Procedure, like the other procedures, is designed to be brief and positive in nature.

The primary child-goals of the Model Procedure are: (1) to establish a basic vocabulary; (2) to train generalized imitation; and (3) to train a strategy for incidental learning of vocabulary. Other child-goals of the Model Procedure, as well as the remaining three procedures, are establishing joint attention as a cue for verbalization and training turntaking skills.

The second procedure trained was the Mand-Model Procedure. The Mand-Model Procedure is used to elicit information which the child already knows or is likely to know. This information may have been trained using the Model Procedure. If, after one or two mands, the child has not given the appropriate response, the adult goes into the Model Procedure and presents the response for the child to imitate. Verbal praise plus an expansion of the child's response follow correct responses. Corrective feedback consisting of the desired response, and when appropriate, praise for attempting the response, follow incorrect responses. The major child-goals of the Mand-Model Procedure are: (1) to train responding to a variety of adult-presented cues, and (2) to train the child to provide upon request, information he or she already knows.

The third procedure trained was the Delay Procedure. The Delay Procedure is used to train the parent to allow the child time to initiate communication about needs, wants, or environmental stimuli. Thus, unlike the Model and Mand-Model Procedures, in which the adult verbally elicits language from the child, the Delay Procedure teaches the adult to refrain from talking in order to afford the child an opportunity to initiate an interaction.

Implementation of the Delay Procedure begins with one or two delays by the adult. The delays serve as a cue for the child to verbalize. If the appropriate response does not follow a delay, the adult has the option of going directly into the Model or Mand-Model Procedure as a means of eliciting the target response.

In terms of child-goals, the Delay Procedure is primarily used to train the child to initiate verbal interactions about environmental stimuli.

The Incidental Teaching Procedure is trained last. This procedure simply requires using the three previously trained procedures in a new situation. Whenever the child initiates a request or a command (and in so-doing, specifies a reinforcer), the adult elicits more complex or elaborated language from the child by following up the request/command with their the Model, Mand-Model, or Delay Procedure.

The child-goals of the Incidental Teaching Procedure are: (1) to build requesting behavior; (2) to train elaborated language about particular topics; and (3) to increase the length of conversation about particular topics.

Training procedures. Training of each technique occurred in the clinic and consisted of: a lecture explaining the technique; a videotape showing the trainer using the technique individually with three children (one of whom was the parent trainee's child); and a written handout describing highlights of the target technique. During the first training session at the home, the trainer modeled use of the technique with the child and then gave feedback following practice of the technique by the mother with her child. After initial training on each technique, bi-weekly observation and feedback sessions were conducted in the home. During these sessions, mothers and children play with toys during a 15-minute audiotaped session. At the beginning of each session, descriptive and graphic feedback were given on use of the techniques during the previous session. After 10 minutes of play, mothers were given specific feedback on their application of the procedures. An addition 15 minutes of audiotaped practice followed the break for feedback.

The techniques were trained one-at-a-time. After a new technique was trained, mothers were asked to practice using it, and to continue using the previously trained techniques.

In addition to using the procedures during the training sessions, mothers were asked to apply the techniques incidentally throughout the day whenever opportunities arose to work on their child's language. Generalization measures were obtained in three settings: (1) during audiotaped Practice Sessions that took place when the observer was not present; (2) when the mother was engaged in a domestic chore; and (3) when the television was on. Maintenance checks were conducted monthly for three months following completion of the Incidental Teaching condition.

In the training, generalization, and maintenance sessions, data were collected on mothers' rate and percentage of correct use of the techniques. Data on changes in child responsiveness, intelligibility, rate and linguistic complexity were also collected.

Results. Results of the study indicated that mothers did not use the teaching procedures during baseline. Rate and percentage of correct use of each procedure increased immediately following training on that procedure. Furthermore, mothers used several different teaching procedures within a single session. All mothers generalized, to varying degrees, their training to all three generalization settings. Results also showed that children's responsiveness and rate of talking increased when mother-teaching was introduced. Data on the complexity of child responses have not been fully analyzed, but it appears that changes in complexity also occurred following training. Anecdotal reports by parents and by teachers in the children's preschool classroom suggested that attentiveness, responsiveness, and imitative skills improved following mothers' use of these techniques. Trained mothers consistently have reported their satisfaction with the training program.

Initial conclusions. Several issues which were identified as requiring additional research became apparent during this study. One of those issues concerned the difficulty of applying the techniques with children exhibiting behavior problems. It became clear during the study that the behavior problems of some children interfered with their mother's ability to effectively apply the procedures. Further applications of incidental language training by parents might be enhanced by developing an assessment procedure for determining when behavior management training is in order prior to training in language intervention.

A second issue for future research concerns identifying training procedures that preserve the truly incidental quality which is intended in these procedures. In the study I've described, mothers practiced using the techniques in 15-minute play interactions with their children. Perhaps because rate of use of the procedures was included in their feedback, the mothers seemed to try to use each procedure as often as possible during the 15-minute interactions. It was not uncommon for mothers to use the procedures two times a minute. This frequent use of the procedures resulted in a more-than-desirable didadtic-like quality to the interactions. In order to optimize a more incidental application of the procedures, future training might focus on parents' application of the procedures in several natural settings and situations. Incidental application might also be enhanced if feedback focused on utilization of naturally occurring opportunities, with less emphasis on rate of use.

There is empirical evidence to suggest that like trained teachers, parents can also be trained to use incidental teaching strategies with young, language-delayed children. There are also data indicating that mothers are likely to generalize their use of the techniques to other, non-training situations. Data reflecting mothers' maintenance of the trained techniques are still being collected. It has also been found that as a result of parents' use of incidental teaching strategies, improvements may be seen in the rate, complexity, intelligibility, and functional use of language by the children.

III. GENERAL DISCUSSION

A brief summary of the basic results of this research program is presented below.

1. Comprehensive language training efforts with language-delayed preschool children do result in significant generalization. But this generalization is limited to those structures trained that are within the child's general developmental level.

2. Language trainers should strive for a communicative match between the curriculum and the general developmental level of the child in order to facilitate maximal generalization.

3. Many language-delayed children come out of intensive structured individualized preschool intervention programs, go into public school classrooms, and then tend to plateau in terms of their rates of academic and language development.

4. Identified poor communicators in kindergarten classrooms tend to differ from good communicators primarily in terms of the structural characteristics of their speech and their conceptual knowledge and abilities compared to their peers.

5. Milieu teaching strategies (i.e., time delay, modeling, mand-model procedure, incidental language teaching) are the most effective alternative or augmentative language training procedures that we studied. We recommend that they be routinely incorporated into both preschool and elementary language intervention. Their effects are generalized and they can be effectively utilized by parents and teachers.

These results represent a mix of encouraging and discouraging findings. We have found that children in a 'state of the art' preschool language training program do not make entirely successful transitions to public school classrooms and we believe the problem is that they have failed to acquire a generalized "learning to learn" strategy. Faced with new content in new circumstances, brought on by their transition to regular public school classrooms, they do not do very well, despite their success in our program. This suggests that it is not the generalization of the specific content, but the learning strategies acquired by the children that is most important in the long run. This conclusion is further supported by our findings on the differences between good and poor communicators in elementary school and on the developmental constraints on language generalization.

What is the common denominator here and what are the implications for early language remediation and for promoting successful transition of these children into the public schools? To put it in the most positive terms possible, this data suggests that we have not yet addressed the most basic issue of remediation—how to teach a child a generalized learning strategy that can be utilized to acquire new information and skills in new situations and settings across time. Children did well in the preschool because it was a remedial, highly supportive, carefully individualized environment. This cannot be typically said of public school classrooms. Short of a social revolution in the American education system, about the only thing we can do is devise preschool intervention programs that succeed in teaching the child a strategy for learning—not just a smorgasbord of specific skills which we believe the child will need in other settings.

We believe the optimal preschool language training program to be a combination of structured and milieu training. Structured training in combination with generalization programming will lead to generalization. But milieu training will further enhance this generalization, facilitate language acquisition in general, increase rate and responsiveness, and perhaps most important, teach the child the mediating functions of language. This approach will facilitate a communicative and social match between the child and anyone using it, and can be used 24 hours per day. Finally, this approach utilizes the child's attention and is usually child directed, thus giving it maximal functionality. In sum, further research on the uses and applications of milieu teaching strategies, is our number one recommendation.

We have a number of other areas of recommendations as a result of our research on language generalization over the past 6 years and these are presented and discussed in the remainder of this section.

A New Generation of Programs?

The field of language remediation may be ready to pass from its initial "founding" phase to a new phase. During the initial phase, a number of comprehensive training programs were developed. These programs have not been based directly on a systematic, scientific effort although they have been strongly influenced by research in psycholinguistics, psychology, behavior analysis, and the speech and hearing sciences. The programs were developed to meet the educational requirements of the many retarded and language-delayed individuals who have recently entered the mainstream of educational systems. The rapid development of treatment programs has in many ways met this initial need. There are now over 170 programs (Fristoe, 1976) which claim to teach language. The extent to which each program meets its goals is a timely question. There is a second question which follows logically from the first: How can language training programs be made to work better? Answers to these questions should provide the basis for the development of a new generation of language training programs.

The new generation language training programs should meet three criteria. First, content and procedures should be based on research in language development and remediation. Second, program formats should reflect recent developments in the technology of generalization. Finally, programs should be subjected to a generalization analysis conducted longitudinally in the natural environment to determine their overall effectiveness. The third criteria requires considerable time and resources. Yet, if such analyses are not carried out, there will be no basis for insuring that programs are effective in meeting their intervention goals.

Second generation programs will not represent completely novel curricula. Rather, they will consist of the pieces of current programs which have been shown to work (via longitudinal generalization analysis), combined with new content and techniques based on recent research. As such, they will represent the logical evolution of treatment rather than a revolution. The three criteria for these programs warrant further elaboration.

1. Incorporate developmental research. Knowledge of how normal children acquire and learn language has grown enormously in the last 20 years. The usefulness of this work from a therapeutic perspective depends on the extent to which it can be related to language remediation.

Historically, many interventionists have often chosen to ignore developmental data because it infrequently offers a sufficient task analysis for teaching new skills. In some instances, such as the severely retarded child in an institutional setting, the selection of a nondevelopmentally based curriculum may be warranted because the communication skills to be trained will be few and quite specific to the student's restricted environment. Generally, developmental data describing what the child normally learns in natural environments can be very useful to the language programmer. If viewed from a behavioral perspective, developmental data represent those behaviors (communication function, semantic relationships, and grammatical forms) which are most frequently required and reinforced by the natural environment. Selecting training examples and structuring programs which coincide with the environmental language demands should maximize generalization opportunities.

Although few psycholinguists have examined language with the intention of providing a basis for treatment, their research has provided important perspectives on both the function and structure of language. To this point, the impact of developmental research has been felt most strongly in the content of training programs. During the 1960s, psycholinguists emphasized syntactic development (Chomsky, 1959; McNeill, 1966). Many training programs developed during and after this time have focused on syntax training. In the 1970s, the psycholinguists shifted emphasis to semantics (e.g., Brown, 1973; Schlesinger, 1971), and subsequent training programs emphasized semantic training (Miller & Yoder, 1974; Stremel & Waryas, 1974). Since the early 1970s, the emphasis has moved toward pragmatics or function of language (e.g., Bruner, 1975; Dore, 1975; Moerk, 1975). As yet, few language training programs expressly represent this emphasis, although some new programs will. Interestingly, the current pragmatically oriented psycholinguistic analysis of language acquisition shares many assumptions with Skinner's (1957) models of adult language (Hart, in press; Moerk, 1977). As a general rule, for a response to generalize, it must be functional in nontraining settings. Thus, research describing the typical communicative intents or ways normal children use language may suggest examples and teaching formats that will be useful in training functional language skills with delayed students.

Currently, descriptions of how mothers actually teach language to their children (e.g., Folger & Chapman, 1978; Moerk, 1976) are appearing. Studies describing the strategies, tactics, and formats mothers naturally use to sequence and integrate language in daily interaction may provide models for effective training techniques. Possibly, optimally successful training programs will require the primary caretaker to be the intervention agent. In such a format the therapist would treat the caretaker-child dyad, not the child alone. Such an approach might readily improve the generalization potential of training because it would occur in settings where language normally will be used and at least one person (the caretaker-interventionist) will be readily available to shape, prompt, and reinforce the child's language. MacDonald, Blott, Gordon, Spiegel, and Hartman, M. (1974) have provided one model of such an approach for young Down's syndrome children and their parents.

A survey of currently available language training programs suggests that only a few have incorporated recent behavioral or psycholinguistic research. The majority of the programs reflect one or another dimension of language (syntax, semantics, pragmatics) at the expense of other aspects. Optimally, all three systems must be accounted for because functional communication requires the child to use all three. The "form/function" model we developed under Objective 1 is meant to do this.

A conceptualization of the relative roles of syntax, semantics, and pragmatics in language acquisition is important to the selection of content for new remediation programs. As knowledge of these aspects of language and their integration changes, emphasis in training should follow. Likewise, information about how mothers teach language to their children may be useful in devising naturalistic formats for training. Finally, a knowledge of how other conceptual skills (e.g., short and long-term memory, problem solving, etc.) interface with language could indicate other behavioral repertoires which should be trained concurrently for language training to achieve maximal effectiveness. In short, language training programs should evolve and change as knowledge of language itself evolves and changes. By this standard, most of the currently available programs are out-of-date and need revision and modification.

2. Incorporate a generalization technology. The second criterion for new training programs is that they incorporate techniques and procedures to promote generalization of training to the natural environment. Generalization is receiving increasing attention in

all types of treatment endeavors and frequently is recognized as the most relevant measure of treatment effectiveness.

Much progress has been made toward a technology of generalization. Many components of this technology have been specified (e.g., Stokes & Baer, 1977). In language training the systematic use of techniques such as multiple exemplars (e.g., Guess & Baer, 1973), common stimuli (e.g., Rincover & Koegel, 1975), indiscriminable contingencies (e.g., Schwartz & Hawkins, 1970), and "loose training" (e.g., Schroeder & Baer, 1972) holds much promise for facilitating better generalization, especially when combined with a highly relevant and functional content. Nevertheless, a great deal of research remains to be done on the application and effectiveness of these techniques.

Generalization is mentioned in some language training programs, but procedures for facilitating it are seldom specified. The naturalistic, conversational formats used in some training programs (Bricker & Bricker, 1970; MacDonald & Blott, 1974) may promote generalization but no current curriculum systematically facilitate generalization. The development and incorporation of generalization, assessment, and facilitation procedures within the training curriculum is the second recommended criterion.

3. Assess generalization. The overriding issue of generalization is the guiding principal in all three proposed criteria. The third criterion requires the use of naturalistic assessments to measure the effectiveness of the intervention program. Ideally, the program being evaluated will be a result of changes made on the basis of the preceding recommendations.

The third criterion insures that information about effectiveness of new programs is available to potential users. Unfortunately, the application of these criteria may be expensive in terms of both time and effort. It necessitates the measurement of the different possible effects of training over extended periods of time in several settings. Only to the extent that generalization is shown by this approach can a program be considered successful. Ongoing measurement of generalization can also indicate specific aspects of a program which do not work. This, in turn, will allow further modification of the program. For example, in conducting a longitudinal generalization analysis using the Guess, Sailor, and Baer (1978) training program, it has been found that several steps in the program do not work very effectively (i.e., generalize) with severely retarded children. Based on this information, program revisions are now in progress. If this logic were followed in the development of all programs, eventually all programs would work as effectively as possible. The process is time consuming, and not particularly compatible with the rapid development of new programs. However, there is no advantage to be gained from new programs unless they can be proven to work better than existing ones.

The three proposed criteria can and should be applied to existing programs. Many aspects of these programs may work. If so, there is no need to develop entirely new programs. A more reasonable and economic approach would be to revise current programs on the basis of the proposed criteria and promote the wide dissemination of these programs. Such a process will take several years. In the meantime, there are a number of things which individual therapists and practitioners can do with existing programs to make them more effective. Much can be done now by carefully selecting from existing programs the curricula with the most functional characteristics, further modifying these programs to encourage generalization, and then measuring for generalization.

Using Available Programs

A large number of programs currently exist, and some of these programs are better than others, particularly for certain types of populations. For example, the Guess, Sailor and Baer (1978) language training program is a function-based curriculum well suited for institutionalized severely and profoundly retarded children. It is extremely well specified within its limited purpose. It does not purport to teach a complete set of normal language skills. Therefore, it would not be wise to use this program with minimally or moderately retarded home-living children. Other programs are better suited to teach more broadly based skills in a less redundant fashion. In general, when selecting a training program the following guidelines should be followed.

1. Make sure the content to be trained is functional. Training word and sentence forms which the child will never have reason to display in the natural environment is a poor generalization tactic. Emphasize simple sentence forms which are likely to elicit positive consequences for the speaker in terms of actions performed, needs met, or social conversations conducted.

2. Make sure the content is trained using a multiple exemplar format of the general form, at least. For example, if the goal is to train a child to make requests, several forms for doing this might be taught. That is, train multiple exemplars of multiple exemplars. For instance, one might train "I want (hat, cup, ball, toy, coke)" and "Please give me (hat, ball, cup, toy, etc.)". Both forms have the same function but have different forms. Incorporate previously trained simpler forms into more complex forms. This ensures repeated exposure to the simple form and allows the student to learn new forms via chaining or shaping.

3. Make sure solid behavioral principals are used throughout training. Almost all programs use some standard behavioral procedures like shaping, modeling, and differential reinforcement. However, frequently these procedures are poorly specified. Some programs ignore the critical necessity of fading out reinforcement to a schedule more like what one would find in the natural environment. Instead, they specify that the child should receive reinforcement after every correct response until the response is acquired. Then, another response is immediately trained without fading reinforcement for the first response. Such an approach is likely to result in response extinction (Ferster & Skinner, 1957).

The topography of reinforcement must be functional. Food and social praise are often potent reinforcers in training, particularly with severely retarded children. However, these are not generally the reinforcers available for language in the natural environment. Attention, continued conversation, and fulfillment of requests are more typical consequences. "Natural" reinforcers may have to be introduced gradually in order to maintain responding, but unless the student's performance can be maintained with such reinforcers, generalization is unlikely.

4. Make sure that other generalization facilitating formats and procedures are specified in the program. For example, determine if training can sometimes be conducted in a natural environment (e.g., the classroom, the home, etc.). Look for the systematic use of two trainers to encourage generalization across persons. Training in the presence of peers may be useful for the same reason. Additionally, check to see if the program specified procedures for selecting stimuli used in the training setting based on their presence in the generalization setting.

Modifying Existing Programs

Very few current language training programs contain information meeting these guidelines. Individual trainers will need to modify programs to increase effectiveness. To do this, a trainer must have a general knowledge of the current technology of generalization. A careful reading of the Stokes and Baer (1977) review of generalization techniques is recommended.

Within the guidelines outlined previously, several specific modifications are suggested: using of multiple exemplars, multiple trainers, multiple training settings, and incorporating variable schedules of functional reinforcement. Other suggestions to enhance generalization follow.

1. Children should be taught to initiate newly trained language. The training format of many programs only teach the child to respond to questions and models from the trainer. Verbal initiations will help the child recruit reinforcers and language learning opportunities in the natural environment. Excellent suggestions for training children to initiate speech are discussed by Hubbel (1977).

2. Along the same line, students should be taught how to participate in conversation, to take turns speaking, and to follow the conversation topic. Current events discussion groups can be useful in facilitating this skill (e.g., Keilitz, Tucker, & Horner, 1973). Unfortunately, little systematic research has been conducted on efficient ways to train this skill. Initial training in nonverbal interaction and turn taking may be quite useful as well (Bruner, 1975).

3. Increase the overall rate of the child's speech. Rate of speech is an often overlooked dimension of language delay. Most language deficient children not only speak poorly, but also infrequently.

With an appropriate moderately high rate of speech, a child can contact the natural reinforcers for language as well as provide increased opportunities for trainers or caretakers to expand and discretely correct the child's language by providing alternative models. The use of incidental teaching techniques have been shown quite effective in building rate (Hart, in press; Hart & Risley, 1975).

4. The inclusion of parents and caregivers as trainers and facilitators of language is complementary to direct training. Their participation in the remediation efforts can facilitate generalization and encourage incidental language tutoring. Most language prompting and training procedures can be easily adapted for parental use. The trainer should see that these are done systematically. Such an approach can effectively make a child's entire environment a language training setting (which is how the environment works for normal children). The milieu training approach offers the ideal vehicle to accomplish this.

Measuring Generalization

Measuring generalization from language training to the clinical settings does not have to be prohibitively expensive or unwieldy. It should be a standard part of the overall treatment program. The demonstration that the student has generalized the target responses should be the ultimate criterion for treatment effectiveness. Several generalization assessment strategies can be used by the clinician.

Structured probes should be included as a first step in assessing generalization. If students fail to produce a correct response during the probe it is unlikely they will produce these responses in natural environments when the stimuli and consequent events are even less similar to training conditions. Probes can serve as a useful screening device to indicate which forms require further training for generalization and which forms might be expected to be used spontaneously by the child outside of training. Finally, probes are economic and easy to incorporate directly into the sequence of training.

While probes should be a standard part of any training program, they are not a completely reliable indicator of the student's use of the training items in natural environment. Correct responses under probe conditions do not assure students will actually produce these responses in conversational contexts (Warren & Rogers-Warren, 1980). The cost in both time and effort of generalization measurements in the natural environment does not have to be prohibitive for clinical purposes. A number of approaches may be used including those outlined below.

1. Teachers and caretakers can be provided with a list of trained forms that have generalized during structured probes. They may then record students' use of these forms during the periods they interact with them. This informal technique may have the added benefit of bringing the caretaker or teacher's attention to the child's progress.

2. The parent or teacher might also present probe items from a list of trained forms. These informal probes could be carried out in the context of the student's ongoing activities. For example, if the phrase "want ball" were among the training items, a parent playing ball with the child might hold the ball up and say to the child, "What want?". This technique not only provides a measure of generalization, but may be a means of facilitating it.

3. It is also recommended that therapists occasionally make verbatim records of students' speech in nontraining settings. Observations should be made at times when speech is a high probability event for the student, such as freeplay time in the classroom. Verbatim observations should be kept as a permanent record of the child's actual language use. Weekly 15-minute observations would allow therapists to estimate generalized effects of training on the student's linguistic structure and pragmatic functioning by comparing these samples with the child's training records and past natural samples. Observation times and settings should be varied and the frequency of observations maintained to increase the probability of obtaining reliable, representative samples of the student's language production.

Naturalistic observations may provide therapists with additional information on the dimensions of the student's delay, which can be used to modify training in ways appropriate to a child's specific disabilities. Standardized tests, the basis for placement or many children in language remediation programs, are generally biased to measure production instead of comprehension. Naturalistic observations may indicate that a student seldom displays language, even though new forms are learned quite easily in training. This is an indication the child needs training in the pragmatic and social aspects of language, as well as the conceptual aspects.

The naturalistic assessment of generalization by therapists goes hand in hand with other strategies suggested above. In the absence of proven training curricula, this strategy can insure a degree of effectiveness in program modifications made by the trainers themselves.

Future Research Directions

We have much basic and applied research left to do. Our technology of generalization has perhaps only addressed the first level of the generalization problem. The study of generalization following transition may be an extreme test, but it's also an ultimately valid test of comprehensive remediation efforts.

A few suggestions, then, for future research:

1) Research on the effects of incidental teaching strategies on the acquisition of generalized learning strategies.
2) The experimental analysis of procedures to train generalized attention and discrimination skills—a relevant area where we still need to do much work.

3) Research on training children how to recruit information, goods and services from their environment: that is, how to mediate their environment optimally.
4) Research on cross-modal transfer—a crucial learning process we still do not fully understand. This may be a particularly important process for children having trouble acquiring language.
5) Research on natural stimulus class formation, expansion, reorganization, and elimination.
6) Applied research on the specific conditions under which handicapped children learn optimally—as measured by the display of novel generative behavior.
7) Research on ways to inexpensively but acurately measure language generalization in the home and classroom.
8) Research on ways to efficiently and effectively train parents and teachers to be milieu language trainers.

Conclusion

The study of the effects of transitions on children's generalization, skill acquisition, and maintenance takes us far beyond the laboratory and even the initial learning situation. It forces us to address head on both the strengths and limitations of our behavioral science to date, and may eventually cause us to view the issue of generalization from a much broader perspective than we currently do. In the meantime, educators and clinicians are urged to adopt and modify programs, with the intent of enhancing generalization of trained skills and to insure the effectiveness of these modifications through systematic generalization assessments. Even more importantly, they are urged to begin utilizing milieu training approaches as much as possible. Future major improvements in the field of language remediation may depend on the pursuit of these recommendations.

IV. DISSEMINATION SUMMARY

The following is a summary of dissemination efforts to date. Additional dissemination efforts of the research findings will probably continue for several years through the journal publication process. This summary has been divided into three sections: 1) Articles published or in press; 2) Articles in preparation; 3) Papers presented at conferences.

Articles Published or In Press

Rogers-Warren, A., & Warren, S. F. Mands for verbalization: Facilitating the display of newly taught language. *Behavior Modification*, 1980, *4*, 361-382.

Warren, S. F., & Rogers-Warren, A. Current perspectives in language remediation: A special monograph. *Education and Treatment of Children*, 1980, *3*, 133-153.

Warren, S. F. Language generalization: The state of the art. Inflections, 1980, 1, 7-13.

Warren, S. F., Rogers-Warren, A., Baer, D. M., & Guess, D. The assessment and facilitation of language generalization. In W. Sailor, B. Wilcox, & L. Brown (Eds.), Methods of instruction for severely handicapped students. Baltimore: Brooks Publishers, 1980.

Warren, S. F., Baxter, D., Anderson, S., Marshall, A., & Baer, D. M. Generalization and maintenance of question-asking by severely retarded adolescents. Journal of the Association of the Severely Handicapped, 1981, 6, 23-32.

Rogers-Warren, A., & Warren, S. F. Form and function in language learning and generalization. Analysis and Intervention in Developmental Disabilities, 1981, 1, 389-404.

Warren, S. F., & Rogers-Warren, A. Setting variables effecting the display of trained noun referents by retarded children. In K. Kernan, M. Began, & R. Edgerton (Eds.), Settings and the behavior and study of retarded persons. Baltimore: University Park Press, 1982.

Rogers-Warren, A., Warren, S. F., & Baer, D. M. Interactional bases of language learning. In K. Kernan, M. Begab, & R. Edgerton (Eds.), Settings and the behavior and study of retarded persons. Baltimore: University of Park Press, 1982.

Warren, S. F., & Rogers-Warren, A. Language acquisition patterns in normal and handicapped children. Topics in Early Childhood Special Education, 1982, 2, 70-80.

Rogers-Warren, A., & Warren, S. F. Pragmatics and generalization. In R. L. Schiefelbusch (Ed.), Communicative competence. Baltimore: University Park Press, in press.

Warren, S. F., & Rogers-Warren, A. (Eds.) Teaching functional language. Baltimore: University Park Press, in press.

Warren, S. F. Evaluating the effects of training: Methodological issues and clinical strategies. In S. F. Warren & A. Rogers-Warren (Eds.), Teaching functional language. Baltimore: University Park Press, in press.

Rogers-Warren, A., & Warren, S. F. Facilitating early language and social development: Parents as teachers. In E. M. Goetz & K. E. Allen (Eds.), Early childhood education: Special, environmental and legal considerations. Rockville, MD: Aspen Systems Corporation, in press.

Campbell, R., Stremel-Campbell, K., & Rogers-Warren, A. Programming teacher support for functional language. In S. Warren & A. Rogers-Warren (Eds.), Teaching functional language. Baltimore: University Park Press, in press.

Rogers-Warren, A. K., Ruggles, T. R., Peterson, N. L., & Cooper, A. Y. Playing and learning together: Patterns of social interaction among normal and handicapped preschoolers. Journal of the Division of Early Childhood, Council on Exceptional Children, 1981, 3, 56-63.

Rogers-Warren, A. K. Behavioral ecology in classrooms for young handicapped children. Topics in Early Childhood Special Education, 1982, 2, 21-32.

Rogers-Warren, A. K. Teaching talking in the classroom (ECI Document No. 802). 1981.

Rogers-Warren, A. K. Arranging preschool environments for young handicapped children (ECI Document No. 380). 1981.

Articles in Preparation

Warren, S. F., McQuarter, R. J., & Rogers-Warren, A. The effects of mands and models on the speech of unresponsive language-delayed preschool children. Submitted to Journal of Speech and Hearing Disorders.

Warren, S. F., & Rogers-Warren, A. A longitudinal analysis of language generalization to the real world of the severely handicapped adolescent.

Warren, S. F., & Rogers-Warren, A. A longitudinal analysis of language generalization by language-delayed preschool children.

Warren, S. F., & Rogers-Warren, A. An analysis of form and function and their effect on language generalization.

Warren, S. F., & Rogers-Warren, A. The generalization of syntax by the severely handicapped.

Warren, S. F., & Rogers-Warren, A. The generalization of syntax by language delayed preschool children: Developmental limitations.

Warren, S. F., & Rogers-Warren, A. The computer analysis of language generalization.

Warren, S. F., & Rogers-Warren, A. The elusive measurement of language generalization.

Alpert, C. A., & Rogers-Warren, A. Training parents as incidental language teachers: An analysis of generalization.

Presentations

Rogers-Warren, A., & Warren, S. *Language generalization: Measurement and facilitation*. A symposium presented at the annual meeting of the American Speech, Language, and Hearing Association, Atlanta, November 1979.

McQuarter, R. J., Warren, S. F., & Rogers-Warren, A. K. *The multiple effects of a procedure to increase rate of child verbalizations*. Paper presented at the sixth annual meeting of the Association for Behavior Analysis, Dearborn, Michigan, May 1980.

Warren, S. F., Rogers-Warren, A., & Buchanan, B. G. *A longitudinal analysis of comprehensive language training: Generalization to the real world*. Paper presented at the biannual meeting of the Society for Research in Child Development, Boston, April 1981.

Warren, S. F. *What can experimental training studies tell us about language development?* Paper presented at the annual meeting of the Association for Behavior Analysis, Milwaukee, May 1981.

Warren, S. F., & Rogers-Warren, A. *A milieu approach to teaching language*. A miniseminar presented at the annual meeting of the American Speech, Language and Hearing Association, Los Angeles, November 1981.

Warren, S. F., Dennis, C. E., & Anderson, J. R. *The transition of language delayed preschoolers into kindergarten: An ecobehavioral analysis*. Paper presented at the eighth annual convention of the Association for Behavior Analysis, Milwaukee, May 1982.

Warren, S. F. *Research on language intervention: Assessment, measurement and research perspectives*. Two day Invited Symposium presented to the Child Development and Mental Retardation Center Clinical Training Unit, University of Washington, Seattle, Washington, July 22-23, 1982.

Warren, S. F., & Rogers-Warren, A. *A longitudinal analysis of language generalization to the "real world" of severely retarded institutionalized adolescents*. Paper presented at the annual convention of the Association for the Severely Handicapped, Denver, November 1982.

Warren, S. F. *Language remediation and generalization with young language delayed children*. Invited presentation made to the staff of the Austin, Texas Public Schools, January 13, 1983.

Rogers-Warren, A., & Warren, S. F. *New directions in language generalization research*. Paper to be presented at the annual Gatlinburg Conference on Mental Retardation Research, Gatlinburg, Texas, March 1982.

Warren, S. F., & Rogers-Warren, A. K. *Practical applications of a generalization technology for teaching language skills.* Invited paper presented at the annual meeting of the RIP Project Staff, Nashville, October 2, 1980.

Rogers-Warren, A. K., & Warren, S. F. *Current perspectives in social-ecological research with mentally retarded populations.* Invited paper presented at the annual meeting of the NICHD Mental Retardation Center Directors' Meeting, Kansas City, Missouri, November 17, 1980.

Rogers-Warren, A. K. *Current research at the University of Kansas*. Invited presentation for the Optomist Club, Lawrence, Kansas, January 22, 1980.

Rogers-Warren, A. K., Ruggles, T. R., Peterson, N., & Cooper, A. Y. *Social interaction among normal and preschool children in mainstreamed classrooms*. Invited paper presented at the annual meeting of the Handicapped Early Childhood Education Projects (First Chance Network, Bureau for the Education of the Handicapped), Washington, DC, December 1980.

Rogers-Warren, A. K. *New therapeutic strategies for preschool handicapped children*. Invited paper presented at the annual meeting of the Handicapped Early Childhood Education Projects (First Chance Network, Bureau for the Education of the Handicapped), Washington, DC, December 1981.

Alpert, C. L., Anderson, J. R., & Rogers-Warren, A. *The training of parents of young handicapped children*. Presented at the Kansas Governor's Conference for Parenthood, Wichita, Kansas, March 1982.

Roedel, S. M., & Rogers-Warren, A. K. *Dissemination: From research to practitioner*. Paper presented at the annual meeting of the Council on Exceptional Children, Houston, Texas, April 1982.

Alpert, C. L., & Rogers-Warren, A. K. *Teaching functional language to the handicapped: Using the natural environment as the context for training*. Paper presented at the annual meeting of the Association for Behavior Analysis, Milwaukee, May 1982.

Rogers-Warren, A. K. *Behavioral ecology: Some working definitions*. Paper presented at the annual meeting of the Association for Behavior Analysis, Milwaukee, May 1982.

Alpert, C. *Procedures for selecting a nonspeech communication mode and facilitating its use through incidental training*. Invited paper presented at the International Symposium on Autism, Woodbury, New York, February 1982.

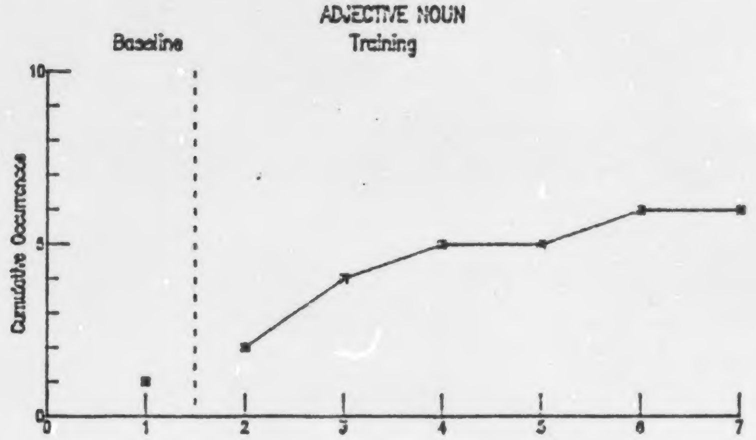
Alpert, C. *Milieu intervention techniques*. Workshop for the Billings, Montana Public School District, August 1982.

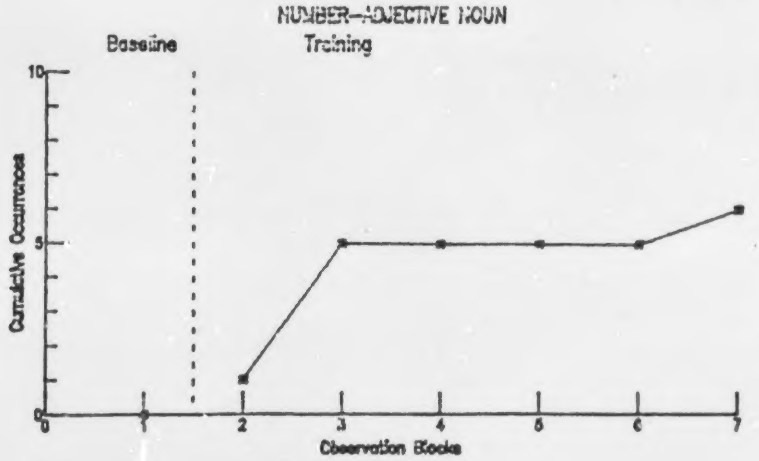
Appendix 1

Cumulative Graphs of Individual Subject Longitudinal Generalization Data

All the generalization data represents the subjects' actual use of the trained structure under natural conditions in their preschool classroom. A summary of this analysis was also presented in the previous report. In this appendix we wish to present the individual subject graphs for 10 children. This includes data for 34 forms trained over time across these subjects. This data is presented in multiple baseline design fashion in the following figures. In these figures the generalized effects of training each form can be seen for each subject. All data is organized into sequential observation blocks. Each observation block represents four consecutive observations.

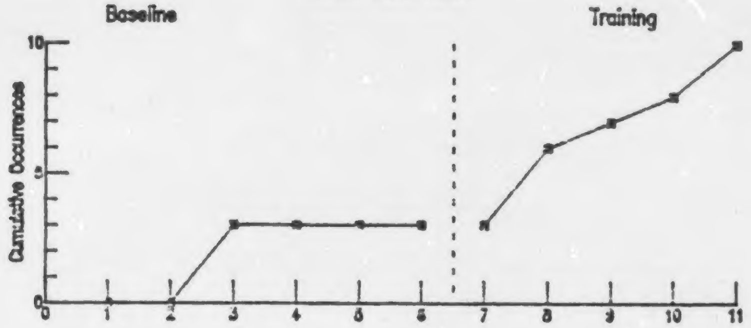
FORM GENERALIZATION – N.S.





FORM GENERALIZATION – D.R.

STATE-VERB NOUN



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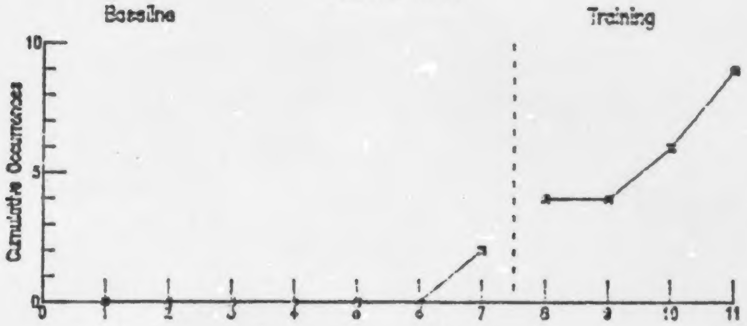
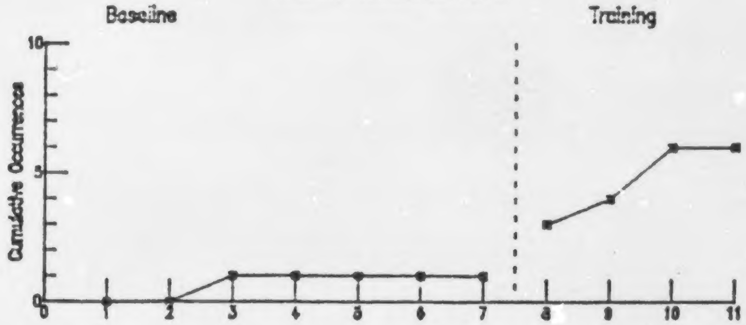
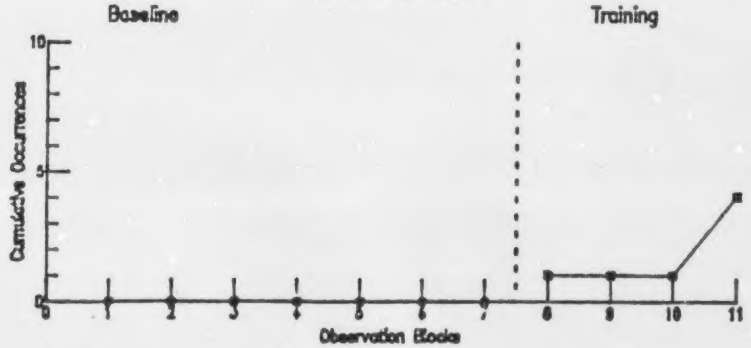


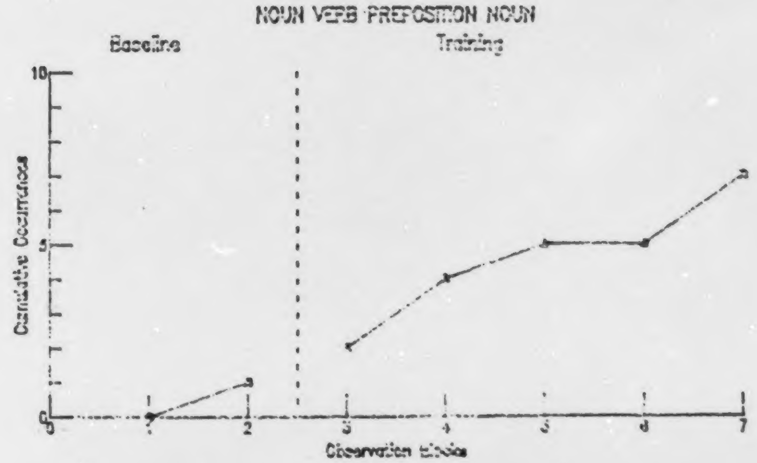
NUMBER-ADJECTIVE NOUN



NOUN VERB NOUN

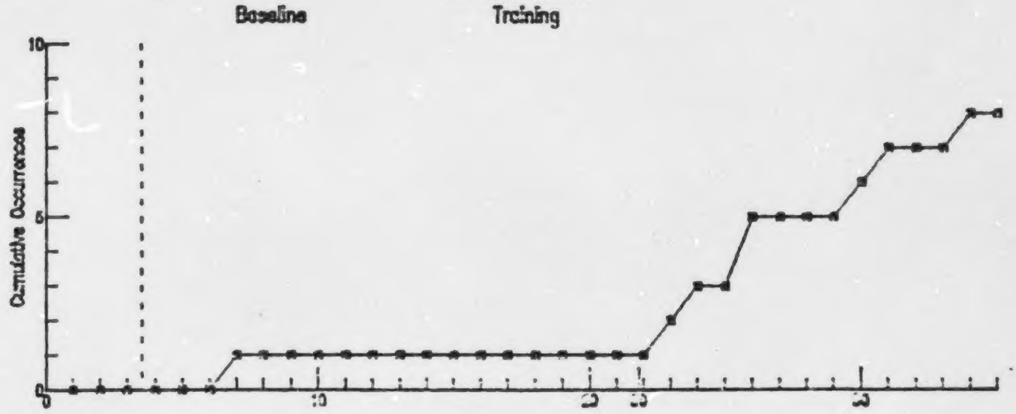


FORM GENERALIZATION -- J.C.

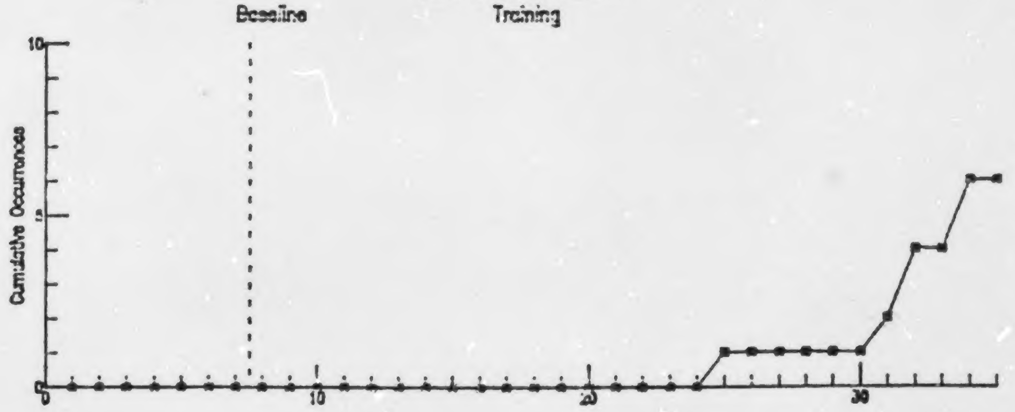


FORM GENERALIZATION - D.P.

NOUN VERB-ING



COLOR-ADJECTIVE NOUN



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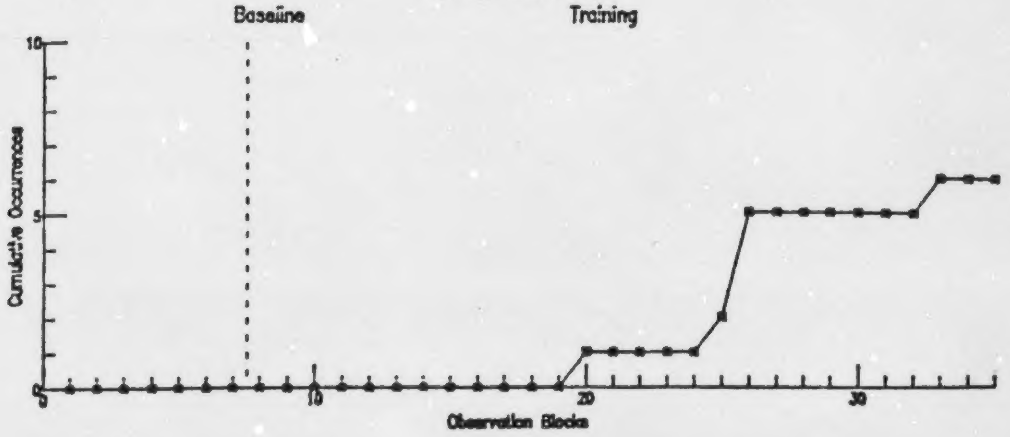
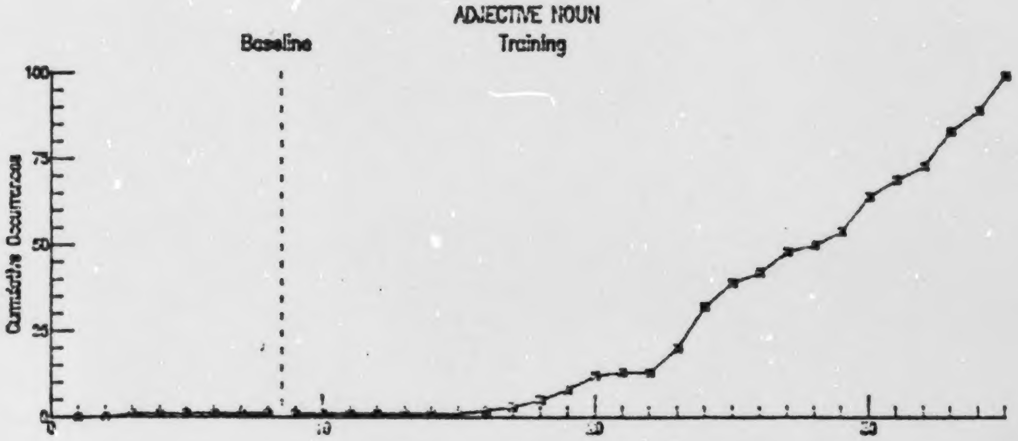
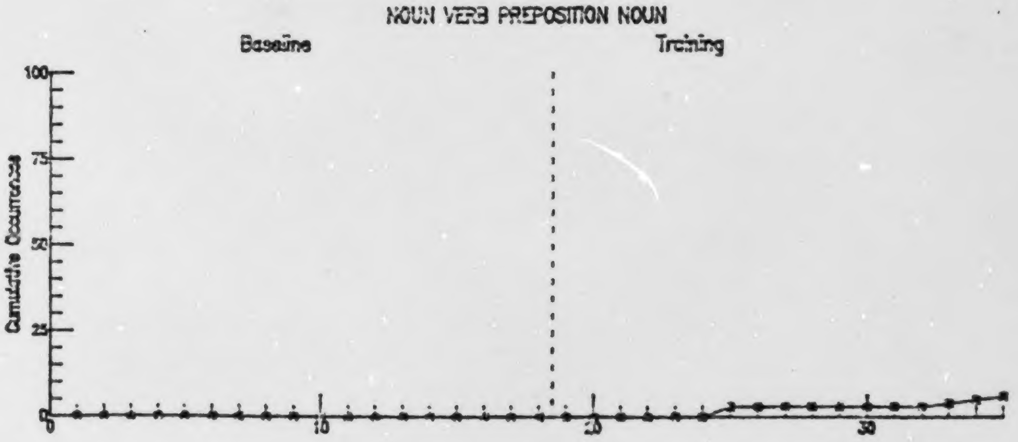
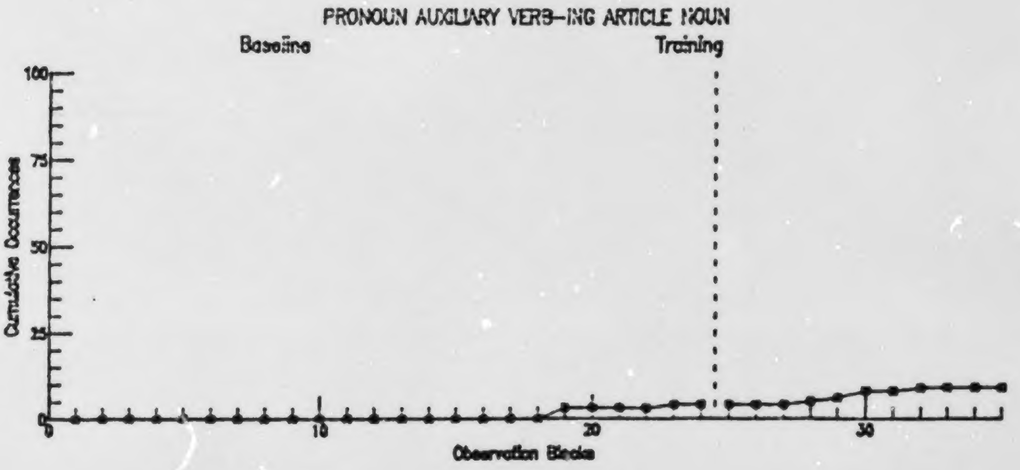


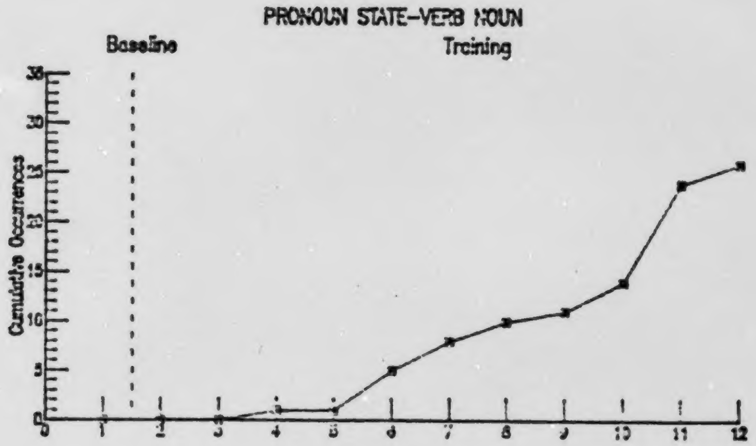
FORM GENERALIZATION – D.P.

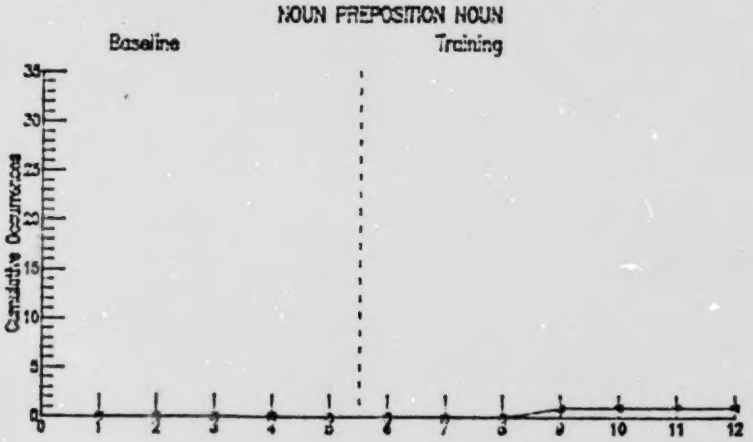


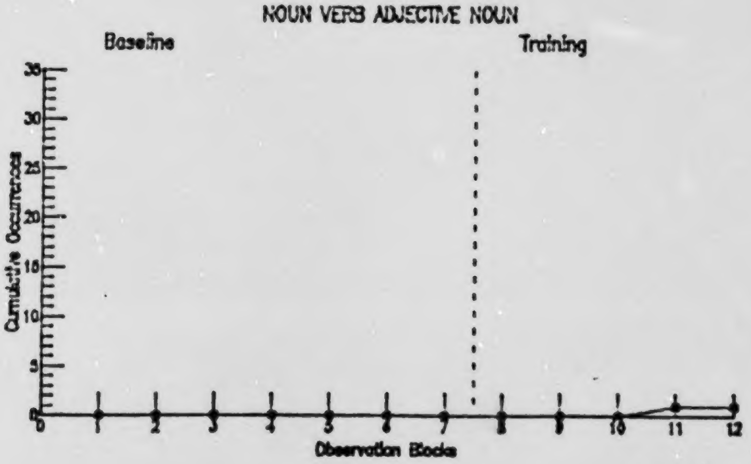




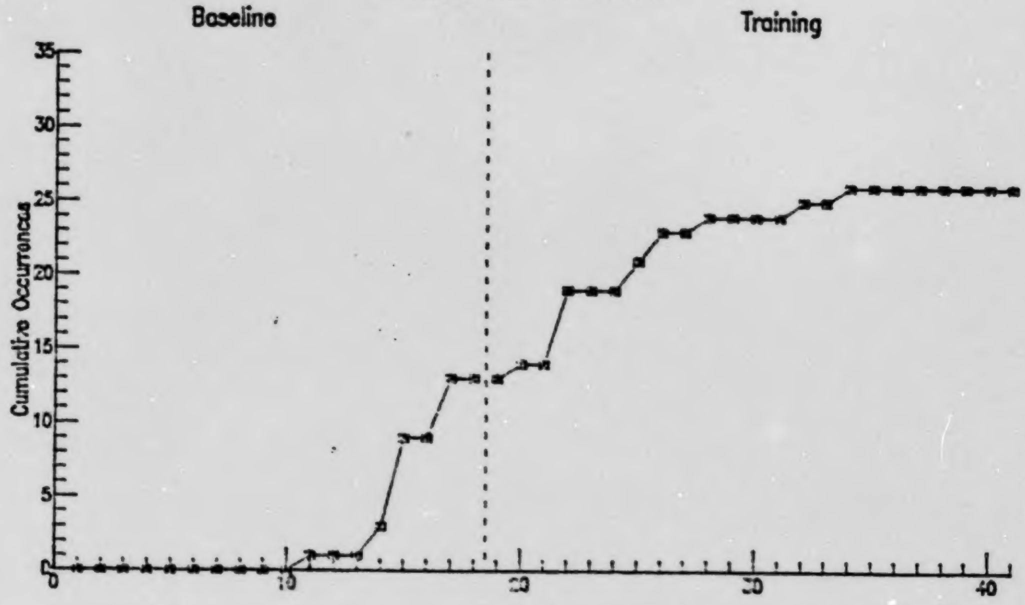
FORM GENERALIZATION – T.M.


PRONOUN STATE-VERB NOUN

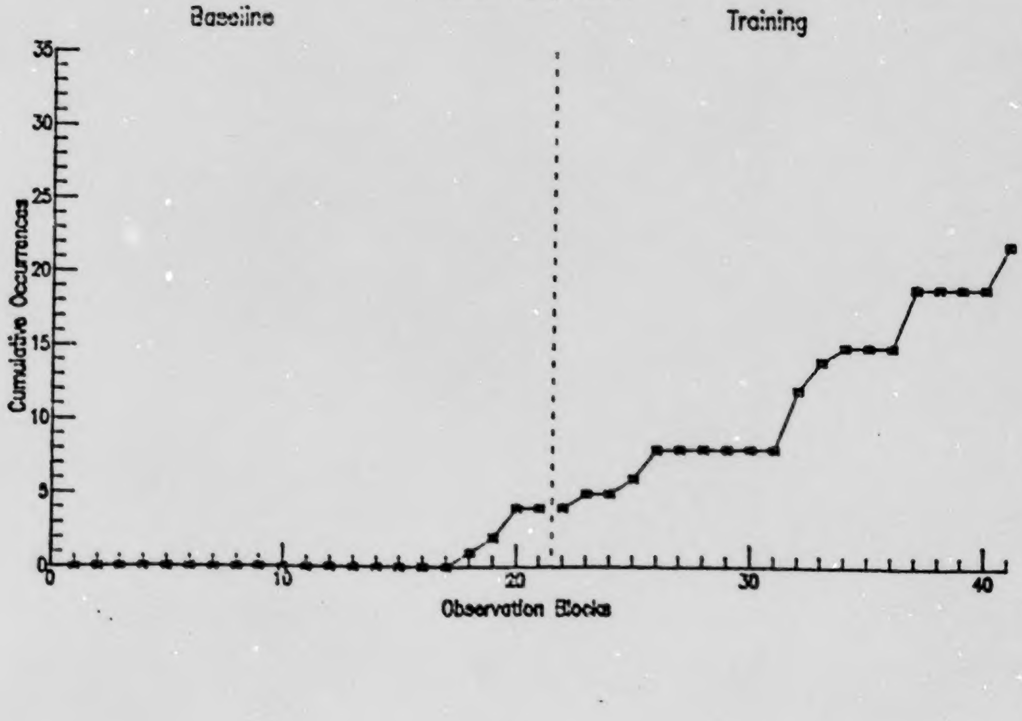

NOUN PREPOSITION NOUN


NOUN VERB ADJECTIVE NOUN

FORM GENERALIZATION – D.B.

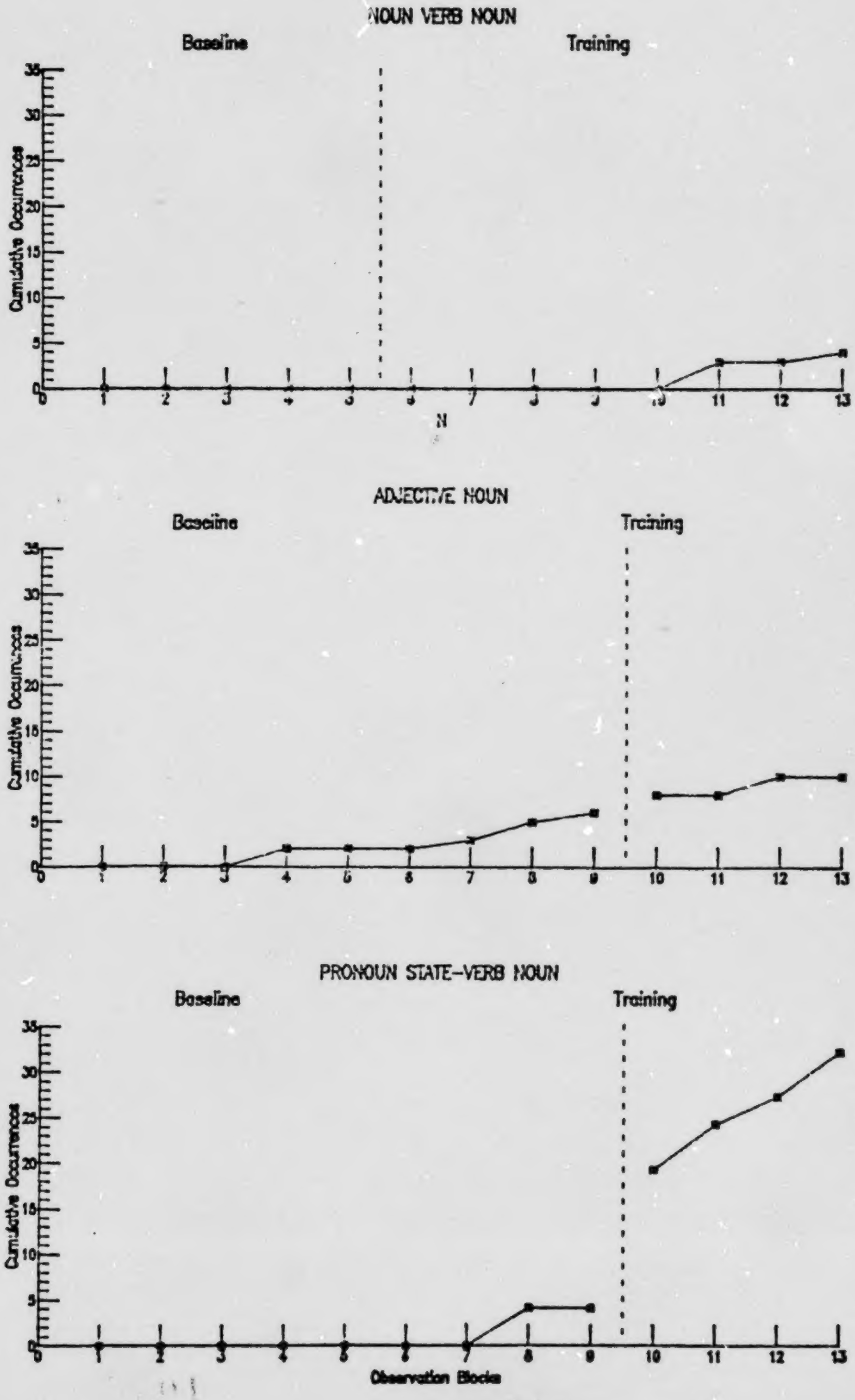


COLOR-ADJECTIVE NOUN



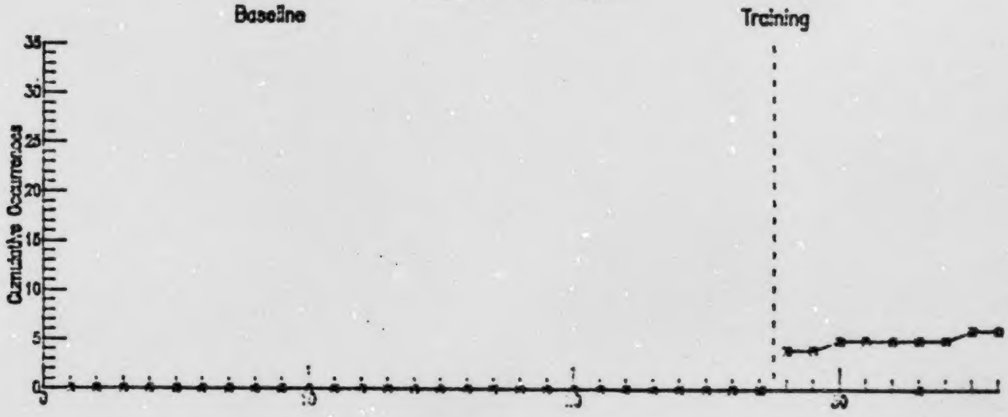
NOUN VERB NOUN

FORM GENERALIZATION – K.P.



FORM GENERALIZATION – L.B.

ARTICLE ADJECTIVE NOUN



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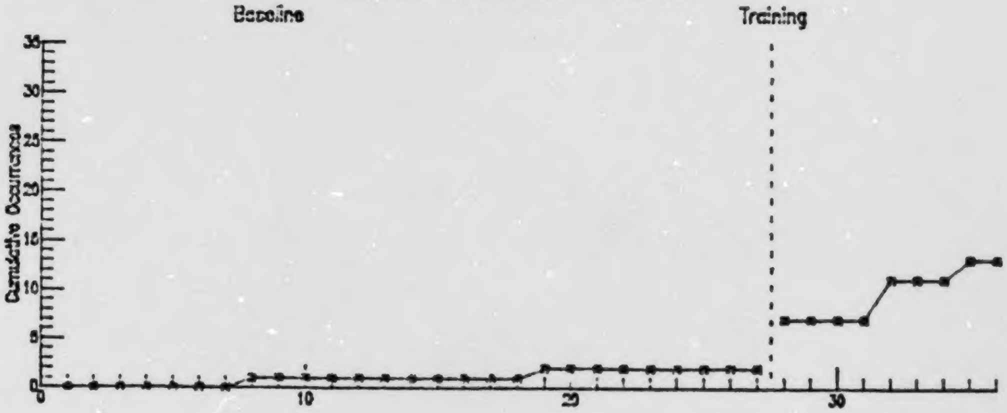

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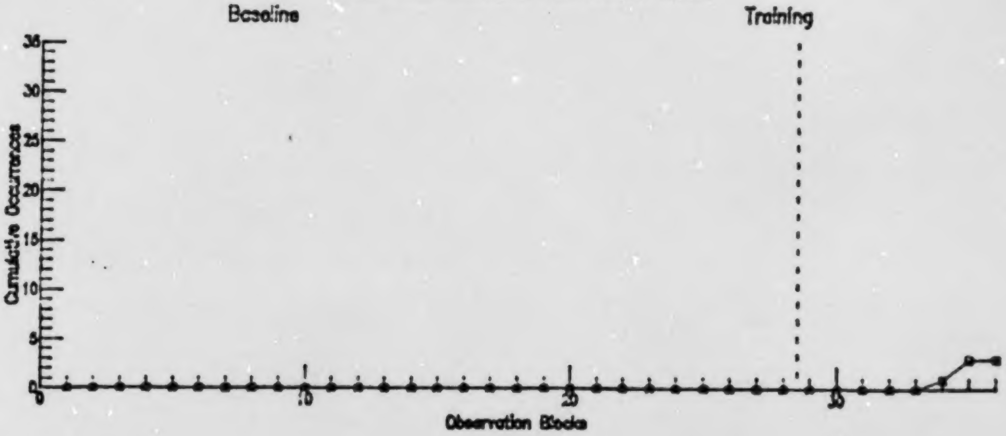

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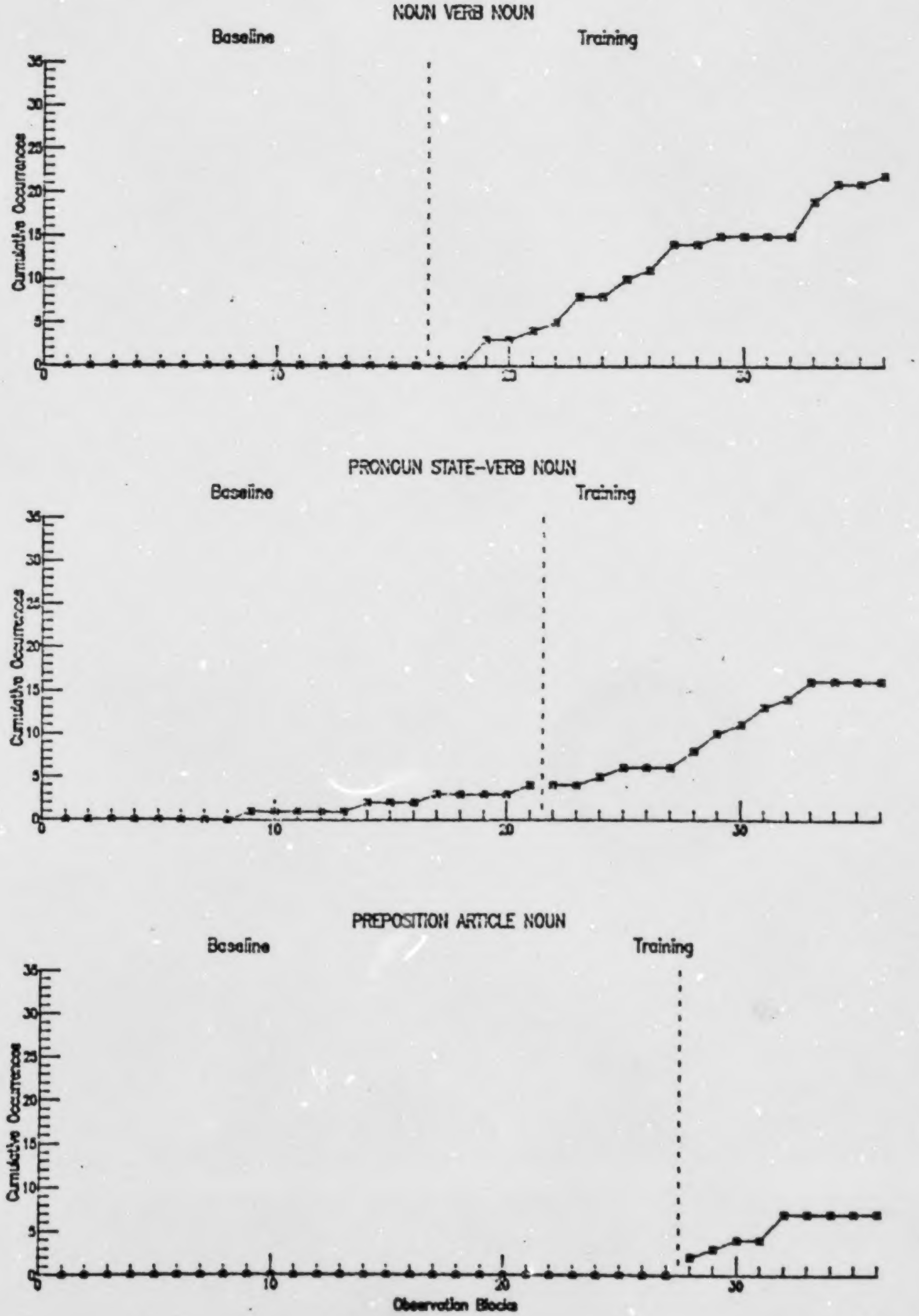

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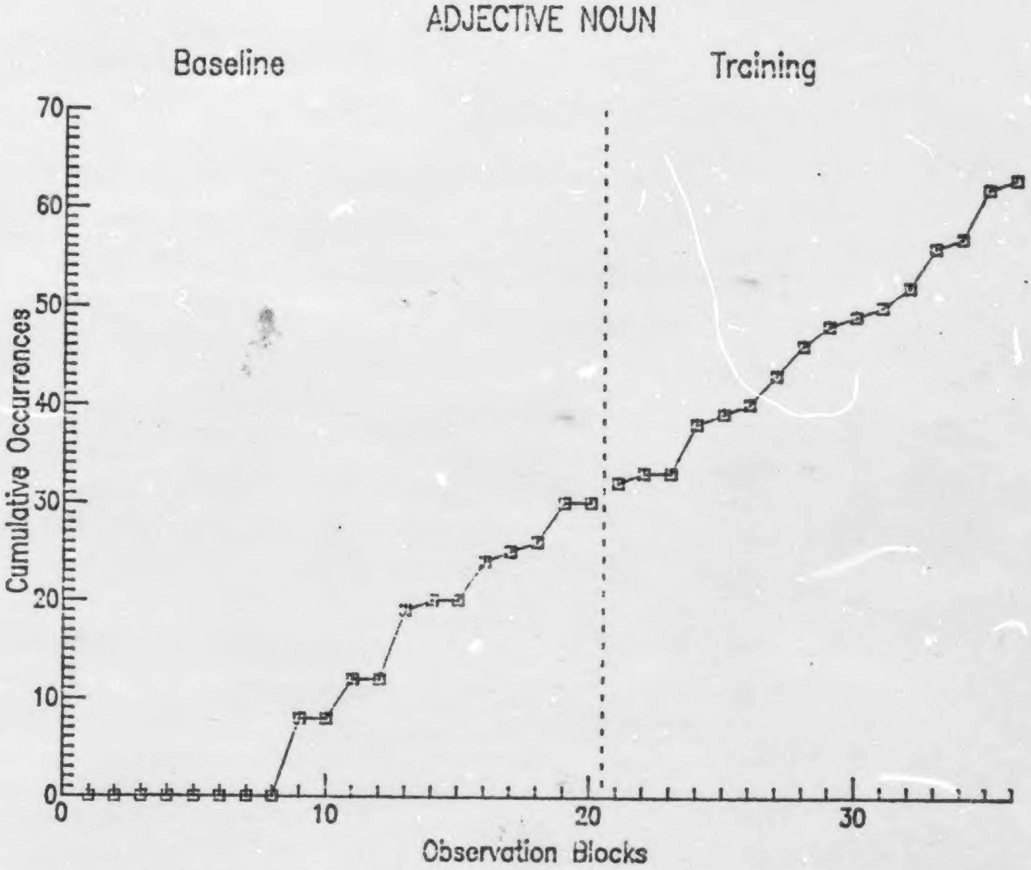
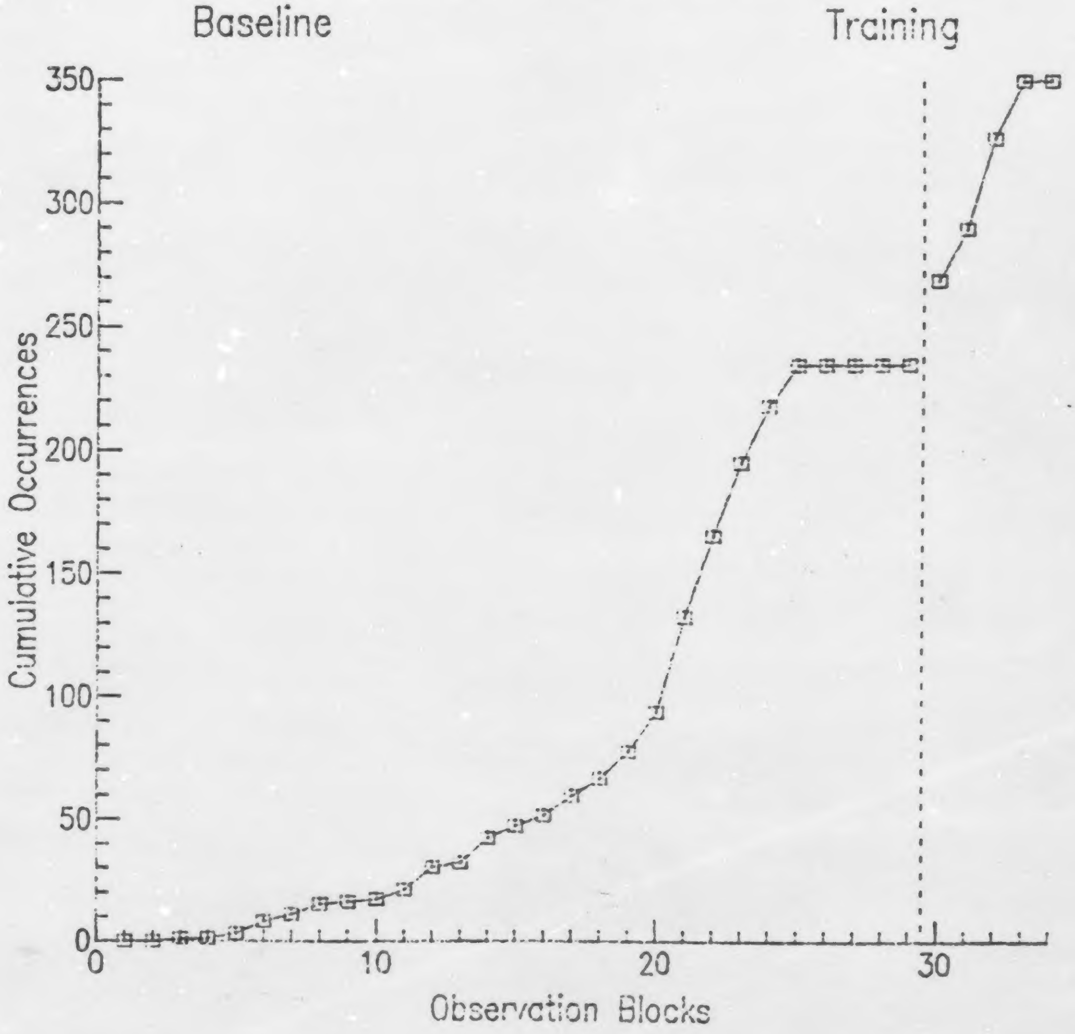
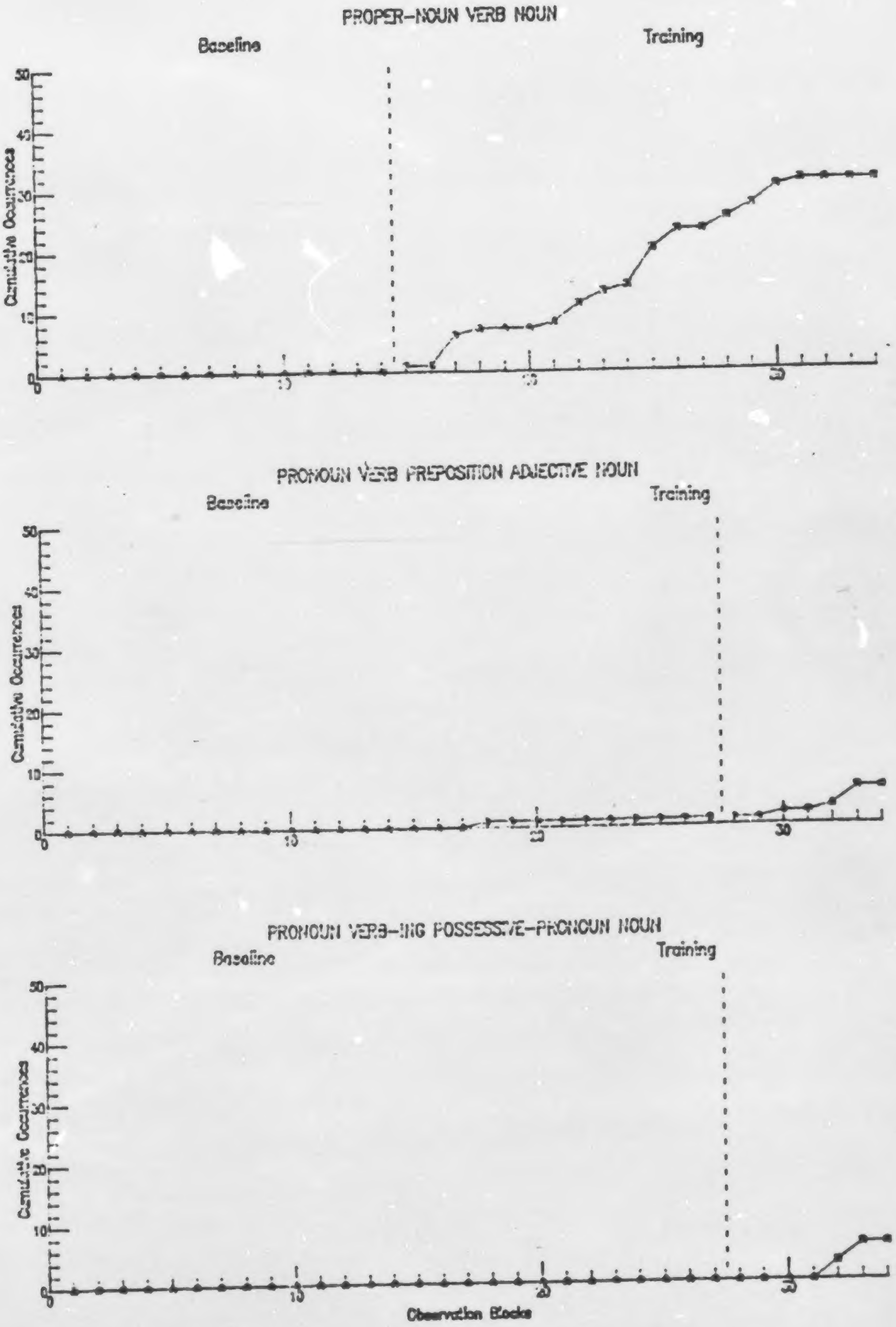


FORM GENERALIZATION – M.H.

PRONOUN VERB PRONOUN



FORM GENERALIZATION – M.H.

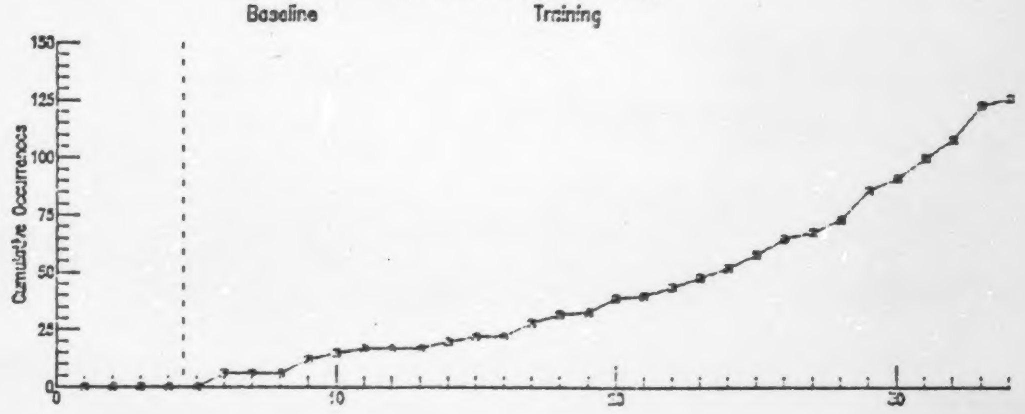

PROPER-NOUN VERB NOUN

PRONOUN VERB PREPOSITION ADJECTIVE NOUN

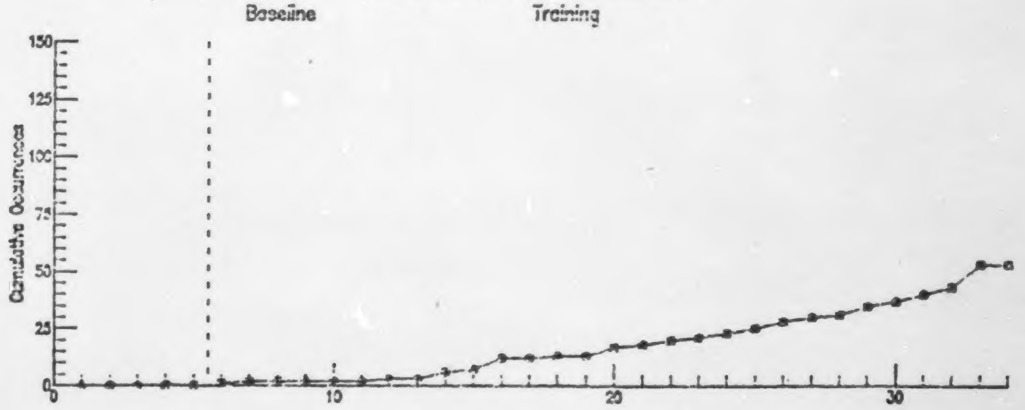
PRONOUN VERB-ING POSSESSIVE-PRONOUN NOUN

FORM GENERALIZATION – M.H.

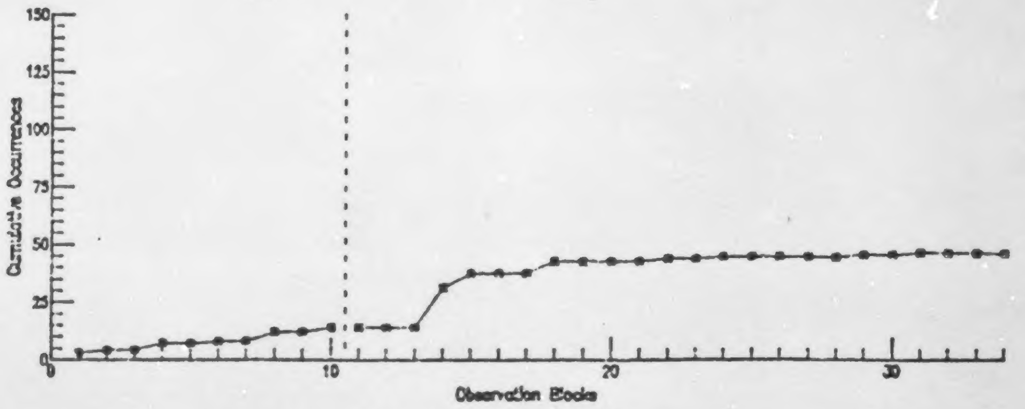
PRONOUN STATE-VERB NOUN



PRONOUN STATE-VERB ARTICLE NOUN



COLOR-ADJECTIVE NOUN



Appendix 2

Observation Codes

This appendix consists of two observation codes used in this research program. The two codes are: (1) Instructions for Live Verbatim Recording, including reliability instruction; and (2) the Child Verbalization Context Code. Each code is self explanatory and contains a sample data sheet.

Instructions for Live Verbatim Recording

1. Record everything the child says exactly as it is said. Do not correct it.

   Examples: subject-verb disagreement: 'the cats is here'
   incomplete sentences: 'sit chair'

2. Number the minutes (1-15)

3. Using a stopwatch (or the classroom clock if a stopwatch is not available), record the child's utterances in correspondence to the intervals noted above (minutes).

4. An utterance is recorded in the interval in which it began. If an utterance begins in the last second of the first interval, the entire utterance would be recorded in the first interval even though it may have overlapped both the first and second interval.

5. Record child utterances for 15 minutes. If the child leaves the room (e.g., goes to the bathroom), stop recording. Resume recording when the child returns. Do this only when the child leaves the classroom area. Children will frequently move within the classroom, continue recording as they move above.

6. If you cannot understand a word the child says, mark the word as unintelligible (〰). Listen for inflection and try to determine how many words a child said even if you cannot tell what they were.

   Examples: he xxx me/ (one word unintelligible)
   he is xxx xxx xxx chair/ (three words unintelligible)

   NOTE: Because sentences with unintelligible words usually cannot be included for data analysis, please make every effort to transcribe the word.

7. If you are not sure what the word was, but can make a reasonable guess, mark the word as unintelligible (xxx) then indicate in parentheses the probable meaning.

   Example: he xxx (hit) me/

8. Capitalize only proper names and the personal pronoun 'I'.

9. Do not include commas, question marks, or any other punctuation except apostrophes to indicate contractions and possession.

10. Segment utterances by function (see Context Code).

11. Punctuate utterances with a rising intonational contour (question intonation) with double slashes (//).

    Examples: is he a daddy//
    this one//

12. Indicate all target-child utterances directed to peers or teachers by marking (P) or (T) after the utterance.

    Example: Peer to subject - Hi Susie/
    Subject to peer - hi (P)/
    Subject to teacher - there Susie (T)/

13. When transcribing from the tape recording, eliminate all repetitions of a word or sequence of words which occur together within a particular utterance (disfluencies).

    Examples: (a) Child utters - my my ball/
    Transcription - my ball/
    (b) Child utters - that dog that dog is green/
    Transcription - that dog is green/

14. When the 15 minutes of transcription is completed, check it over. Make sure each word is easily readable by the typist. Check the segmentation (making sure that slashes have been used rather than conventional punctuation). Check to make sure the minutes marked correspond to the recorded utterances.

Reliability for Verbatim

1. Score the two records by comparing them, morpheme by morpheme.

   (This comparison means checking each word, and in words with prefixes, suffixes, verb tense markers, plurality markers, etc., also comparing the markers.)

   Examples:

1	2
+ + +	
I ran house	I ran house
+ + -	
he go Ø	he goes
+ + + -	
I need crayons	I need crayon
+ - +	
She's here	She here

2. Mark each agreement as plus (+), each disagreementas minus (-).

3. Compare each record's segmentation of utterances, marking each disagreement.

   Example:

1	2
	-
Right/I'm going now	Right∅I'm going now

4. If one observer has marked a word as unintelligible (∿∿) and the second observer has transcribed the word, do not use this word in determining reliability.

   Example:

1	2
+ - +	
I ∿∿ him	I like him

5. If both observers have scored the word as unintelligible, do not count the agreement in calculating reliability.

6. Reliability for transcription of words is determined by the formula:

$$\frac{\text{Number of agreements}}{\text{Number of agreements plus number of disagreements}} \times 100$$

Preparing Verbatim Data for Computer Entry

I. The Child Verbalization

A. Type one child utterance per line exactly as you hear it on the tape using "xxx" for unintelligible words.

B. Use commas to separate vocatives and interactions:

1. Vocatives are names or one-word attentionals such as "look," "watch"
2. Interactionals are words such as "please," "yes," "no" when tacked onto another sentence at the beginning or end

   "Yes, I want to go."
   "Can I do it, please?"
   "No, that's mine."

C. Exclude utterances that consist entirely of unintelligible words, recitations, counting, singing, except numbers or letters given as one-word responses.

D. Separate morphemes by at least one blank and adjust the root word so it matches common spelling:

go ing run ing bake d	verb endings
I 'm do n't you 're	contractions
she 'is it 'is let 'us	contractions
Ann 's Steve 's	possessives
boat s match es	plurals

E. Don't include oh, ugh, yeow, ow, or repetitions of noise words. However, when a noise word is used as a noun do include it:

this is a choo-choo

F. Change yeah to "yes"
uh-huh to "yes"
uh-uh to "no"
nope to "no"

G. Hyphenate all-right and all-gone.

H. Combine two consecutive nouns into one word.

II. End Markers

A. A single slash ends the child verbalization for all utterances with falling intonation.

B. Two slashes are used to indicate the end of utterances with rising intonation:

that is mine/
Is it mine//

III. Functions

A. List all the checked functions after the slash(es) using appropriate abbreviations separated by blanks.

P#	P
T#	T
Correct +/-	C+/C-
Approp +/-	A+/A-
Mand	M
Verbal Stim	Vs
Declar	D
Quest	Q
Answer	A
Request/Com	RC
Response to Mand	RM
Response to Correct	R+

Vocative	V
Imitation	IM
Repetition	R
Verbal Play	VP
Self Reg	SR
Interactional	IN
Protest	PR
Affirmative	AF
Uncodable	U

CHILD VERBALIZATION CONTEXT CODE[1]

Language Project Preschool
Bureau of Child Research
University of Kansas

Suzanne Gendreau, Barry Buchanan,
Ann Rogers-Warren, and Steven F. Warren
August 1978

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[1] Parts of this code are adapted from Moerk (1976).

This code was developed to record the functions (communicative intents) of child verbalizations observed in various contexts while simultaneously obtaining a verbatim record of those verbalizations. The code is used in conjunction with a tape-recording system (preferably a FM telemetry system). Emphasis is placed on conversational verbalizations although two types of nonconversational utterances can be coded. The functions chosen cover a wide range of child verbalizations, especially those which are stimulated by the verbalizations of others. However, it is not possible to code every verbalization a child makes. In addition, support and stimulation that influence a subsequent child verbalization are recorded.

The code was designed to be used in documenting situation-specific aspects of the functional communication by deviant and nondeviant populations. The code can be used in compiling a functional profile of the communicative idiosyncrasies of an individual child. For best results, the observer should be as familiar as possible with the child being observed.

CONTEXT CODE

CORRECTNESS

An utterance is marked [+ correct] if the lexical usage is correct.

Examples: a) 'Can I have that boat' [- correct]
(object is a car)

b) 'Johnny kicked me' [- correct]
(Johnny actually pushed the speaker)

APPROPRIATENESS

An utterance is marked [+ appropriate] if it seems to indicate that the child behaves in accord ('in tune') with the communcative demands of the situat

Examples: a) conversational partner (C.P.): 'Tell me what you did this morning'

Child: 'I go zoo' [+ appropriate]

If the child does not respond to the content of a given mand, that utterance is coded [-appropriate]

b) C.P.: 'What color is this car?'
Child: 'I go zoo' [- appropriate]

c) C.P.: 'Can you say cash register?'
Child: 'Cash register' [+ appropriate]

VERBAL STIMULI

A verbal stimulus is a verbalization by some other person which in some way provides the incentive for a consequent utterance by the child.

a) Mand: A verbalization which by its nature requires some verbal response by the listener. (See Appropriateness)

b) Verbal Stimulus: Any verbalization other than a mand.

FUNCTIONS

A) Definition: The intention or purpose of the utterance (i.e., in verbalizing what effect the child wishes to produce on his environment or listener).

B) Types of Functions:

1. Declaratives: (Assertions, labeling, descriptions)
   The function of intent is the sharing of information for its own sake. Must not be an answer to a question.

   Examples: 'This book is red'
   'It's raining out'
   'I'm building a bridge'
   'Nancy is not behaving'
   'We're going to the zoo today'
   'Book' (child is pointing to book)

2. Questions: (Interrogatives)
   An utterance is verbalized by the child with the intention of obtaining information from his listener.

   Examples: 'How does this work?'
   'What's wrong with Timmy?'
   'Why won't the door open?'
   'Who's turn is it?'
   'Where is my smock?'
   'Does this work?'

   NOTE: Tags are to be separated (segmented out) from the utterance to which they are attached and given the function of Question.

   Example: 'I put the block there, didn't I'
   A) = + Declarative B) Tag = + Question

3. Answers: Verbalizations in which the child supplies information in response to another speaker's question or request.

Examples:

Other Speaker	Child's Response (Answer)
'Can I have that toy?'	'No, I want it.'
'What are you doing?'	'Playing'
'Are you finished?'	'Not yet'

4. Requests/Commands: Verbalizations uttered with the intention of getting the listener to perform some action (i.e., the use of the listener as an agent or tool in achieving some desired end). These can be stated either directly or indirectly.

Examples:

a) Direct Requests/Commands:

'Open the door!'

'Give me the ball'

'More cookie' (wants another cookie)

b) Indirect Requests/Commands:

	Child Verbalization	Environment
1.	It's hot in here (Declarative)	Child wants listener to open the door
2.	Can you open the door? (Question)	Child is not seeking information. Rather, wants listeners to open the door.
3.	Why not open the door? (Question)	
4.	Can I have a cookie? (Question)	Cookies are up on a shelf--child wants adult to give him one.
5.	I want that toy. (Declarative)	Child wants a toy which someone els has. Wants adult to get it for him.
6.	I don't have a smock. (Declarative)	Teacher has given smocks to each child in a group, but left the speaker out. Child (speaker) says this as an effort to get the teache to give him a smock.

5. Protests: Verbalization uttered with the intention of resisting another person's action or denying another person's assertion, question or command (request).

Examples:

Environment	Child's Verbalization
a) Adult is trying to put the child's shoe on.	'No shoe'
b) Another child is pushing him.	'Don't do that'
c) Adult says 'This is a picture of a dog.'	'No, it's a horse'
d) Adult says 'Go to your room'	'I don't want to'

NOTE: If 'No' occurs as an Answer, it is not a Protest.

6. Vocatives: Verbalization uttered with the intention of calling the listener's attention to something in the environment.

Examples: Look!
Hey you!
Nancy!
Look at me!

7. Interactionals: Verbalizations uttered with the sole intention of initiating (or participating in) some sort of social interaction with the listener. These utterances convey some type of emotion.

Examples: a) Greetings: Hi! How are you?
b) Expressives: I'm sorry. Thank you.

8. Affirmatives: Verbalizations uttered with the intention of letting the listener know that the speaker concurs with someone else's declaration (statement).

Examples:

Environment	Child's Verbalization
a) Other speaker says 'It's raining out.'	'It sure is.'
b) Other child says 'We going to the zoo today.'	'Yes, today.'

9. Verbal Play: This function is scored if the child is uttering a sentence which seems to serve no apparent communicative purpose. The content of Verbal Play must not be relevant to the task at hand. (NOTE: Not to be confused with Self-Regulatory utterances!)

Examples:

a) Child is playing rhyming games with words (e.g., meat, feat, neat, sweet). This utterance should be marked as [+ Verbal Play].

b) Child is repeating the words to a song out loud. (Actual singing is not recorded in verbatim or in the Context Code.)

c) Child is sitting alone and repeating the word 'flies' to him/herself.

(NOTE: This function is not scored with respect to the Appropriate category.)

10. Imitation: An imitation is the repetition of an immediately preceding Verbal Stimulus of another speaker. In this case, only exact repetitions are scored. All words in the child's utterance must correspond to the words in the immediately preceding adult ot peer Verbal Stimulus, although not every word must be included for it to be scored as an imitation.

Examples: Adult - It's a ball. Adult - It's a ball.
Child - It's a ball. (IM) Child - .....a ball. (IM)

11. Repetition: A repetition is scored when the child utters a duplicate of his own immediately preceding utterance. All the words in the child's repetition must correspond to the words in his/her own immediately preceding utterance, although not every word must be included for it to be scored as a Repetition.

Examples:

a) Child: 'I don't need one'
Child: 'I don't need one' [+ Repetition]

b) Child: 'I want another piece of paper'
Child: 'Another piece' [+ Repetition]

(NOTE: The function of the child's repetition must be the same as his previous utterance.)

12. Commissive: A commissive is scored if the child verbally indicates an intention or anticipation of his own future action.

Examples: a) 'I'm gonna make a airplane'
b) 'I'll do it'

13. Self-Regulatory: This function is scored if the child utters a sentence which seems to serve no apparent communicative purpose other than to direct her/his own chain of thought. That is, if the content of the child's utterance is related to the task in which he/she is currently engaged, Self-Regulatory should be scored.

Examples:

Situation	
Child is talking to him/herself while trying to put a puzzle together.	a) 'Let me see' b) 'This one doesn't fit' c) 'I need the blue one' d) 'Where is it?'

(NOTE: This function is assumed to be appropriate. Mark every utterance scored under this category as + Appropriate.)

14. Response to Correction: When another speaker corrects some part of the observed individual's previous utterance and the observed individual responds to the correction, a Response to Correction is scored. (Another speaker's corrections include corrections of articulation, lexical usage, content, syntax, or pragmatics.)

Examples:

a)	Child:	'Blue one'	(Incorrect lexical usage)
	Adult:	'No, not blue, red'	(Adult's correction)
	Child:	'Red'	(Child's response to the correction)
b)	Child:	'Coot me up'	(Incorrect articulation)
	Adult:	'Say scoot not coot'	(Adult's correction)
	Child:	'Scoot me up'	(Child's response to the correction)

15. Response to a Mand other than a Question or Correction: This function is scored when the child responds to any mand other than a question or correction.

Examples:

Mands	Responses
a) Adult: 'Do you have a blue one?' (This is a question - the speaker is seeking information)	a) Child: 'Yes' (This response should be scored as an Answer because it is a response to a Question)

b) Adult: 'No, not blue, red' (This is a Correction - the speaker is correcting the content of the child's previous utterance)	b) Child: 'Red' (This should be scored as a Response to Correction)
c) Adult: 'Can you say cash register?' (This is a Mand other than a Question or Correction)	c) Child: 'Cash register' (This is a Response to a Mand other than a Question or Correction)

16. Uncodable: Utterances whose function cannot be determined using the rules incorporated in the Observational Flowchart (see the Appendix), should be scored as Uncodable. That is, utterances whose function is ambiguous should be scored as Uncodable.

APPENDIX

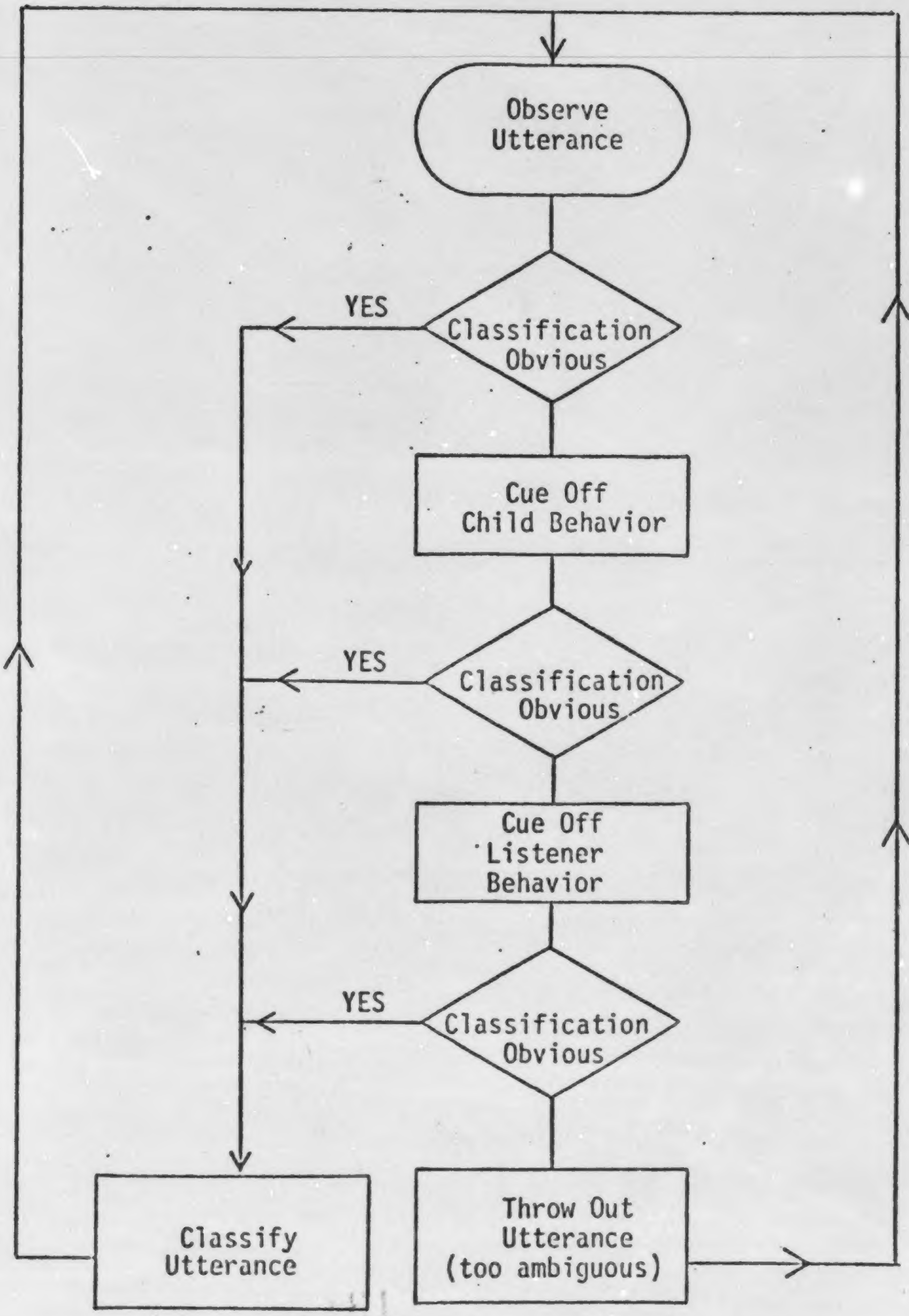
A. Observational Flowchart

(What to do when the function of an utterance is not clear.)

Many of the child's intentions which are clearly present in one situation may be obscure under different conditions. There will be occasions when an utterance can not be scored because it is ambiguous in terms of function. These utterances must be recorded even if they can't be coded. In many instances, the observer can take advantage of various nonverbal cues of speakers and listeners in the determination of the codability of an utterance. To help the observer reach a decision in the coding of potentially ambiguous utterances, the observational priorities to be followed, when coding is not immediately obvious, are presented below in the form of a flowchart.

CONTEXT CODE

The flow chart diagrammed below is to be used in ambiguous situations when it is not immediately obvious how to classify a given utterance.



Example of the Use of Observational Priorities Flowchart

a) Observe Utterance

C.P.: 'Can you find another red block?'

Child: (searches, then picks up block) 'Here'

[Classification: not obvious at this point]

b) Cue Off Child Behavior

1. Child extends arm holding block toward listener at time of utterance.
   [Classification: not obvious]

or 2. Child holds block up (not extending arm toward listener) while looking for listener reaction.
[Classification: + vocative]

or 3. Child places block with other blocks at time of utterance and is disinterested in listener reaction.
[Classification: + declarative]

c) Cue Off Listener Behavior

1. Listener takes block from child's extended hand (without resistance from the child)
   [Classification: + request/command]

or 2. Listener takes block (child resists).
[Classification: + declarative]

or 3. Listener does not react to child extending hand holding block. (Child does not persist in extending arm)
[Classification: not obvious--throw out utterance (do not code function)].

It is important to remember that this flowchart is only an aid. If you can reach a conclusion through other means, by all means, do so.

CONTEXT CODE DATA SHEET

Date: Subject: Observer: Setting: Activity:

		GENERAL				Degree Support		FUNCTION														
Minutes	CHILD VERBALIZATION	P	T	Correct +/-	Approp. +/-	Mand	Verb Stim.	Declar.	Quest.	Answer	Request/ Command	Response Mand	Response Correct.	Voc.	Im.	Repet.	Verbal Play	Self-Reg.	Interac.	Protest	Affirm.	Uncode.

Appendix 3

A Summary of Parent and Teacher Follow-Up Survey Responses

SUMMARY

1st Year Follow-Up

A summary of the responses of 12 parents (representing 12 children involved in the first year of the follow-up study) to a detailed questionnaire concerning their perceptions of their child's communicative, social and academic skills before and after attending Language Project Preschool is presented in Table 1. The mean and range of parent responses to each question is reported. A 1-7 semantic differential scale was employed in the survey.

The means for the differential scale were obtained in the following manner. The number circles for each question was recorded on one composite parent questionnaire form. When two contiguous numbers were circled, then the point value between those numbers was recorded. (For example, if 4 and 5 were both circled, then a point value of 4.5 was assigned and included in the summation.) Each number on the scale was multiplied by the number of subjects who received that number. These products were added together and then divided by the total number of children (11) to obtain a mean for each question, both before and after the children attended Language Project Preschool.

These means (Table 1) indicate that the parents preceived an increase of at least 2 years for every question under the headings of language and academic skills from the time their child entered Language Project Preschool to the time of departure. Parents also perceived a similar increase in social skills except for how easily their child could become upset (question number 8 indicates an increase of a little over a year) and a very slight decrease (0.1 points) in how often their child is aggressive with peers or siblings (question number 11).

All of the parent answers to the open-ended questions in Part II of the Parent Questionnaire are summarized and presented in Table 2. The majority of the parents were extremely pleased with the progress their child made at Language Project Preschool. Four parents offered suggestions as to how Language Project Preschool could have made their child's adjustment to public school easier, while eight parents had no suggestions.

A summary of the teacher answers to the open-ended questions in Section A of the Teacher Questionnaire are presented in Table 3. It is interesting to note that four teachers stressed that, in their opinion, appropriate social skills are much more important for preschools to teach than academic skills. One teacher from a small rural school noted that she sees a large discrepancy between students who have attended preschool and those who have not, particularly in regard to the social skills. With the changing economy, the preschool in her area was closed so that only a few of her kindergarten students had attended one, and this has made the difference between children who attended preschool and those who have not much more discernible.

Table 4 summarizes the responses of 12 teachers (representing 12 children involved in the follow-up study) to a detailed questionnaire concerning their perceptions of the child's communicative, social, and academic skills exhibited in their school during the year following attendance at Language Project Preschool. The mean and range of teacher responses to each question is reported. A 1-7 semantic differential scale was employed in the survey.

The means for the differential scale were obtained in the following manner. The number circled for each question was recorded on one composite teacher questionnaire form. When two contiguous numbers were circled, then the point value between those numbers was recorded (e.g., if 3 and 4 were both circled, than a point value of 3.5 was assigned and included in the summation). Each number on the scale was then multiplied by the number of subjects who received that number. These products were added together and then divided by the total number of children (12) to obtain a mean for each question. The means and ranges for these questions are presented in Table 4.

The teachers' answers to the open-ended questions in Section B were compiled and are presented in Table 5. If standardized tests had been administered, but the results were not yet available, then this information was not reported.

2nd Year Follow-Up

Six follow-up students had parent and teacher questionnaires returned for a second year (in addition to the first year). Means were computed in the same manner as described for the parent and teacher questionnaires in the first year follow-up. One child's surveys were not included in the analysis because the parents did not mark any answers concerning the child's behavior before he attended Language Project Preschool (in the first year follow-up analysis). There appears to be very little difference in the two sets of responses, indicating fairly high test-retest reliability.

The means of the teacher responses for two years of follow-up for the same 5 children are presented in Table 7. All of the differences are less than one year (1.0), except for questions 15 and 22 (indicating a decrease in teacher-perceived aggression) and question 26 (which indicates a decrease in the amount of disruption to classroom routine.

Table 1

SUMMARY OF PARENT RESPONSES - PART I

1st Year Follow-Up

Question	Before LPP Mean (N=11)	After LPP Mean (N=11)	Difference
Language Skills			
1. How clear or easy to understand is your child's speech to those who do not know him/her? (7 = exceptionally easy to understand)	2.1 (range = 1-3)	5.3 (range = 4.5-6)	+3.2
2. How often does your child understand what is being said to him/her? (7 = always)	3.5 (range = 2-6)	5.9 (range = 5-7)	+2.4
3. How well does your child follow instructions? (7 = follows all)	3.0 (range = 2-6)	5.8 (range = 5-7)	+2.8
4. How often does your child talk? (7 = very frequently)	2.6 (range = 1-5)	6.6 (range = 6-7)	+3.0
5. Overall, compared to other children of the same age, how would you rate your child's language skills? (7 = far above age level)	1.7 (range = 1-2)	4.9 (range = 3-6)	+3.2
Social Skills			
6. How well does your child adjust to new situations? (7 = extremely adaptable to all new situations)	3.2 (range = 1-7)	6.0 (range = 4-7)	+2.8
7. How well can your child do things on his/her own? (7 = far above age level)	2.8 (range = 1-[illegible]	6.7 (range = 4-7)	+3.9
8. How easily upset is your child? (7 = extremely calm)	4.1 (range = 1-7)	5.4 (range = 5-7)	+1.3

Question	Before LPP Mean (N=11)	After LPP Mean (N=11)	Difference
9. How good is your child at playing with other children? (7 = plays extremely well with other children)	3.5 (range = 1-7)	5.7 (range = 4-7)	+2.2
10. How well does/did your child talk to and socialize with adults? (7 = far above age level)	2.4 (range = 1-5)	5.5 (range = 4-7)	+3.1
11. How often is your child aggressive with peers or siblings? (7 = almost all the time)	4.0 (range = 1-7)	3.9 (range = 2-6)	-0.1
12. Compared to children of the same age, how long is your child's attention span? (7 = very long)	2.7 (range = 1-6)	5.0 (range = 1-7)	+2.3
Academic Skills How does your child compare to his/her peers in the following conceptual/academic skills?			
13. Counting/math (7 = far above age level)	2.4 (range = 1-5)	5.5 (range = 4-7)	+3.1
14. Pre-reading skills (7 = far above age level)	1.9 (range = 1-7)	5.1 (range = 2-7)	+3.2
15. Overall skills (7 = far above age level)	2.5 (range = 2-4)	5.1 (range = 4-7)	+2.6

Table 2

Summary of Parent Responses -- Part II

Parent Questionnaire

Following each question are the various answers given. The number following each answer refers to the number of parents who gave that answer from a total of 12.

1. To what do you attribute the changes or lack of change noted above? (Preschool program, language training, child growing up, other preschool program or services, your own work with child, public school classes or special services, etc.)

   All of the above------------ 5
   Language Project Preschool-- 9
   Preschool------------------- 4
   Language training----------- 3
   My own work----------------- 1
   Perceptual motor------------ 2
   Special services------------ 1
   L.D. classes---------------- 1
   Summer reading-------------- 1
   Math at LPP----------------- 1
   Growth---------------------- 1

2. What might LPP have done to make your child's adjustment to public school easier?

   Nothing (they did a great job)----------------------8
   Could have worked more on teaching understanding of what was read or taught-----------------------1
   More paper and pencil skills-----------------------1
   Could have taught my child to pay better attention to teachers--1
   He did not receive enough language training; teachers this year had a hard time understanding my child--1

3. Has your child received any special services in the public schools? What?

   Special Education classes----5
   Speech-----------------------3
   No special services----------3
   Perceptual motor clinic------1
   Psychologist one day a week--1

4. What (if any) problem has your child encountered in school since leaving LPP? (For example: academic problems, social or behavior problems)

   None---------------4
   Behavior problems--3
   Slow to learn------1
   Social interaction-------------1
   Debatable—it depends on the teachers
   Frustration (due to my child's hearing loss) due to lack of proper communication

Table 3

Language Project Preschool Teacher Questionnaire

Section A -- Results

The number following each category represents the number of teachers, out of a possible 14, who marked these skills as important.

1. How long would a kindergarten child be expected to sit and remain on task?

15 minutes-----------------------6
10-15 minutes--------------------3 (with one teacher changing this to
25-25 minutes for 2nd semester)
3-8 minutes, then 10-15 minutes--1
15-20 minutes--------------------1
30-40 minutes--------------------1

2. What cognitive skills do you feel are most important to insure a child's readiness for the public school system?

Letter recognition------------------------------7
Count to 25 aloud-------------------------------5
Write own name----------------------------------4
Number recognition------------------------------4
Colors--3
Sound discrimination----------------------------2
Visual discrimination---------------------------2
Spatial relationships---------------------------2
Write numbers-----------------------------------2
[illegible] 4-6 initial sounds------------------------2
Rhyming---2
Recognize own name from array of names----------1
Tell simple fairy tale in correct sequence------1
Do 2 tasks in sequence without teacher prompts--1
Left to right-----------------------------------1
Sizes---1
1 to 1 correspondence---------------------------1
Addition (to 5)---------------------------------1
Complex matching--------------------------------1
Seasons---1
Say ABCs--1

3. What social skills do you feel are most important to insure a child's readiness for the public school system?

Social skills are more important than academic skills;
unsolicited opinion----------------------4
Get along with peers----------------------7
Follow directions-------------------------6
Listen well-------------------------------5
To function in large groups without much
individual attention---------------------5
Communicate own ideas---------------------3

Table 3

(#3 cont'd)

Share with others-----------------------3
Speak to group--------------------------2
Work on-task----------------------------2
Self-help skills------------------------2
Take turns------------------------------2
Positive self-concept-------------------2
Handle conflicts verbally, independently
Use scissors & paste correctly----------2
How to enter groups---------------------1
Avoid aggressors------------------------1
Walk inside building--------------------1
Ask for help appropriately--------------1
Gross motor skills----------------------1
Initiation & completion of short tasks---1
Hands on own work only------------------1
Hold pencil & crayon correctly----------1

4. What experiences should preschool children have to prepare them for a smooth transition to kindergarten?

Read to the child---------------------------1
Develop child's curiosity-------------------1
Develop child's attention span--------------1
Develop language skills---------------------1
Build child's independence & self-confidence-1
Field trips---------------------------------1
Many different types of experiences, in out
  out of school-----------------------------1

Table 4

SUMMARY OF TEACHER RESPONSES

Teacher Questionnaire - Section B *

Question	Mean 1st Follow-Up (N=12)	Range Follow-Up (N=12)
Language Skills		
1. How clear or easy to understand is this child's speech to those who do not know him/her? (7 = exceptionally easy to understand)	4.4	1.5-6
2. How often does this child speak in complete sentences? (7 = always)	4.8	1-7
3. How would you say this child's vocabulary compares to the vocabularies of other children his/her age? (7 = much more extensive - a very large vocabulary)	3.9	1-6
4. How often does this child communicate his/her needs verbally rather than nonverbally (for example, by pointing)? (7 = always uses language)	4.3	3-7
5. How often does this child understand what is being said to him/her? (7 = always)	5.2	2-7
6. How well does this child follow instructions? (7 = follows all)	4.9	2-7
7. How often does this child talk? (7 = very frequently)	4.9	2-6
8. Overall, compared to other children of the same age, how would you rate this child's language skills? (7 = far above age level)	3.8	1-6

*Each question includes a Likert rating scale ranging from 1 to 7. 3-5 is considered the average to good range.

Table [illegible]

Question	Mean 1st Follow-Up (N=12)	Range Follow-Up (N=12)
Social Skills		
9. How well does this child adjust to new situations? (7 = extremely adaptable)	4.2	2-6
10. How well can this child do things on his/her own? (7 = far above age level)	4.1	1-7
11. How cheerful and outgoing is this child? (7 = extremely outgoing)	5.0	4-6
12. How easily upset is this child? (7 = extremely calm)	4.1	2-6
13. How good is this child at playing with other children? (7 - plays extremely well with other children)	4.1	1-6
14. How well does this child talk to and socialize with adults? (7 = far above age level)	4.8	3-7
15. How often is this child aggressive with peers or siblings? (7 = almost all the time)	3.3	2-6
16. How often does this child play with materials and toys appropriately? (7 = always)	5.3	3-7
17. Compared to children of the same age, how long is this child's attention span? (7 = very long)	4.2	2-6
Academic Skills How does this child compare to her/his peers in the following conceptual/academic skills?		
18. Counting/math (7 = far above age level)	4.3	2-7
19. Pre-reading skills (7 = far above age level)	4.1	2-7

Table 1

Question	Mean 1st Follow-Up (N=12)	Range Follow-Up (N=12)
20. Fine motor/writing (7 = far above age level)	3.4	1-7
21. Overall skills (7 = far above age level)	4.0	1.5-6
How does this child compare to her/his peers in the following behaviors?		
22. Aggression to peers (7 = highly aggressive)	4.0	1-7
23. Distractibility (7 = highly distractible)	4.1	2-7
24. Independent working skills (7 = consistently interacts)	3.8	1-6
25. Destructive with materials (7 = never uses materials inappropriately)	5.4	2-7
26. Disruptive to classroom routine (7 = never disrupts classroom)	4.8	1-7

Table 5

Summary of Teacher Responses

Teacher Questionnaire - Section C

Child	Grade	Special Services		If yes, specify	Problems in Classroom	Passed to Next Grade	Standardized Tests (rating)	Child's Strengths and Weaknesses
		Yes	No					
Laura	Preschool		X		Very distractible or excludes all other stimuli	Yes	Stanford Binet (normal)	-Very friendly, helps younger children, above average in self-help skills -Passive, has trouble understanding simple directions
Jolene	1st	X		L.D. class; speech therapy	-needs constant feedback on assignments -follows directions better in small groups	No	-Peabody - below average in oral vocabulary and grammatic completion -age level in picture vocabulary and grammatic understanding -above average in sentence initiation	-trusting, eager to please
Colin	Preschool	X (needs)		Speech therapy (for articulation)	-uses "baby" articulation during group time	Yes		-intelligent, curious, patient -shy
Damian	Kdg.		X			Yes		-curious, understands concepts -weak in language skills

Table 5

Child	Grade	Special Services Yes	Special Services No	If yes, specify	Problems in Classroom	Passed to Next Grade	Standardized Tests (rating)	Child's Strengths and Weaknesses
Barclay	1st	X		Speech; L.D.; Psychomotor clinic	-anything new -large group activities -being in front of class -socially and emotionally below age level -scheduling problem	No	Iowa Basic Test (below age level)	-happy, cooperative, tries to please -problem with reasoning and comprehension in all areas
Craig	Kdg.	X		Speech and hearing		Yes		-good memory, can work independently without much difficulty
Brad	Kdg.		X			Yes	Early Prevention of School Failure - Language (below average) Anton Brennev - (high average)	-good self control; good study skills -opening up in large group discussions
Nick	Preschool	X		Speech	-follower of inappropriate behavior	Yes		-affectionate, persistent, compliant, good disposition (usually)
Tim	1st	X		Speech	-competition bothers him -hates to leave something he enjoys or not completed -impatient	Yes	Stanford Achievement (poor on orally dictated sections)	-strong academically
Corey	Kdg.	X		Speech	-immature	No	Metropolitan Readiness (low in all areas)	-cheerful, cooperative, enthusiastic -low academics, immature language

Table 5

Child	Grade	Special Services		If yes, specify	Problems in Classroom	Passed to next grade	Standardized Tests (rating)	Child's Strengths and Weaknesses
		Yes	No					
Dale	Kdg.	X		Title I	-wants physical contact with other children	Should be put in PSA class		-nice smile, friendly -has difficulty with written work

Table 6

SUMMARY OF PARENT RESPONSES

1st and 2nd Follow-Up Parent Questionnaires

Question	Follow-Up 1 Before LPP Mean (N=5)	Follow-Up 2 Before LPP Mean (N=5)	Difference	Follow-Up 1 After LPP Mean (N=5)	Follow-Up 2 After LPP Mean (N=5)	Difference
Language Skills						
1. How clear or easy to understand is your child's speech to those who do not know him/her? (7 = exceptionally easy to understand)	2.2 (range = 2-3)	1.8 (range = 1-2)	-0.4	5.4 (range = 5-6)	5.8 (range = 5-7)	+0.4
2. How often does your child understand what is being said to him/her? (7 = always)	3.4 (range = 2-6)	3.8 (range = 2-5)	+0.4	6.0 (range = 5-7)	6.4 (range = 5-7)	+0.4
3. How well does your child follow instructions? (7 = follows all)	2.8 (range = 2-6)	3.3 (range = 3-4)	+0.5	5.6 (range = 5-6)	5.7 (range = 5-6)	+0.1
4. How often does your child talk? (7 = very frequently)	2.2 (range = 1-3)	1.8 (range = 1-3)	-0.4	6.8 (range = 6-7)	6.8 (range = 6-7)	Same
5. Overall, compared to other children of the same age, how would you rate your child's language skills? (7 = far above age level)	1.8 (range = 1-2)	1.4 (range = 1-2)	-0.4	4.8 (range = 3-6)	5.4 (range = 4-6)	+0.6
Social Skills						
6. How well does your child adjust to new situations? (7 = extremely adaptable to all new situations)	2.6 (range = 1-5)	2.8 (range 1-5)	+0.2	6.0 (range = 6-7)	5.4 (range = 3-7)	-0.6

Table 6

Question	Follow-Up 1 Before LPP Mean (N=5)	Follow-Up 2 Before LPP Mean (N=5)	Difference	Follow-Up 1 After LPP Mean (N=5)	Follow-Up 2 After LPP Mean (N=5)	Difference
7. How well can your child do things on his/her own? (7 = far above age level)	3.0 (range = 2-5)	3.2 (range = 1-5)	+0.2	5.4 (range = 4-6)	5.8 (range = 4-6)	+0.4
8. How easily upset is your child? (7 = extremely calm)	3.6 (range = 1-7)	3.4 (range = 1-6)	-0.2	5.6 (range = 5-7)	5.0 (range = 4-6)	-0.6
9. How good is your child at playing with other children? (7 = plays extremely well with other children)	2.6 (range = 1-6)	3.8 (range = 1-7)	+1.2	5.8 (range = 5-7)	6.2 (range = 4-7)	+0.4
10. How well does/did your child talk to and socialize with adults? (7 = far above age level)	2.4 (range = 1-4)	1.0 (range = 1)	-1.4	5.4 (range = 4-6)	5.2 (range = 4-6)	-0.2
11. How often is your child aggressive with peers or siblings? (7 = almost all the time)	3.4 (range = 1-6)	2.6 (range = 1-6)	-0.8	3.6 (range = 2-5)	4.4 (range = 4-6)	+0.8
12. Compared to children of the same age, how long is your child's attention span? (7 = very long)	2.4 (range = 2-3)	1.5 (range = 1-3)	-0.9	5.4 (range = 3-6)	5.5 (range = 4-7)	+0.1
Academic Skills How does your child compare to her/his peers in the following conceptual/academic skills?						
13. Counting/math (7 = far above age level)	2.2 (range = 2-3)	1.4 (range = 1-2)	-0.8	6.0 (range = 5-7)	5.6 (range = 4-7)	-0.4
14 Pre-reading skills (7 = far above age level	1.0 (range = 1)	1.0 (range = 1)	Same	5.5 (range = 4-7)	5.4 (range = 4-6)	-0.1
15. Overall skills (7 = far above age level)	2.4 (range = 2-4)	1.8 (range = 1-3)	-0.6	5.2 (range = 4-6)	5.4 (range = 4-6)	+0.2

Table 7

SUMMARY

Teacher Questionnaire - 1st and 2nd Year Follow-Up Evaluations
Section B

Question	Mean 1st Year Follow-Up (N=5)	Mean 2nd Year Follow-Up (N=5)	Difference Increase (+) or decrease (-) from 1st Year
Language Skills			
1. How clear or easy to understand is this child's speech to those who do not know him/her? (7 = exceptionally easy to understand)	4.6 (range = 3-6)	4.4 (range = 3-6)	-0.2
2. How often does this child speak in complete sentences? (7 = always)	5.4 (range = 5-7)	4.4 (range = 2-6)	-1.0
3. How would you say this child's vocabulary compares to the vocabularies of other children his/her age? (7 = much more extensive - a very large vocabulary)	4.2 (range = 3-6)	4.0 (range = 2-7)	-0.2
4. How often does this child communicate his/her needs verbally rather than non-verbally (for example, by pointing)? (7 = always uses language)	4.8 (range = 3-7)	4.2 (range = 2-7)	-0.6
5. How often does this child understand what is being said to him/her? (7 = always)	5.6 (range = 4-7)	4.8 (range - 3-7)	-0.8
6. How well does this child follow instructions? (7 = follows all)	4.6 (range = 2-6)	4.4 (range = 2-7)	-0.2

Table 7

Question	Mean 1st Year Follow-Up (N=5)	Mean 2nd Year Follow-Up (N=5)	Difference Increase (+) or decrease (-) from 1st Year
7. How often does this child talk? (7 = very frequently	5.0 (range = 3-6)	5.2 (range = 3-7)	+0.2
8. Overall, compared to other children of the same age, how would you rate this child's language skills? (7 = far above age level)	4.0 (range = 3-5)	4.0 (range = 1-6)	Same
Social Skills			
9. How well does this child adjust to new situations? (7 = extremely adaptable to all new situations)	4.4 (range = 3-6)	4.4 (range = 3-6)	Same
10. How well can this child do things on his/her own? (7 = far above age level)	3.8 (range = 2-6)	4.6 (range = 2-7)	+0.8
11. How cheerful and outgoing is this child? (7 = extremely cheerful and outgoing)	5.0 (range = 4-6)	5.6 (range = 5-7)	+0.6
12. How easily upset is this child? (7 = extremely calm, nothing ever bothers)	4.0 (range = 2-6)	3.8 (range = 2-6)	-0.2
13. How good is this child at playing with other children? (7 = plays extremely well with other children)	4.4 (range = 1-6)	4.7 (range = 2.5-6)	+0.3
14. How well does this child talk to and socialize with adults? (7 = far above age level)	5.0 (range = 3-7)	4.6 (range = 2-7)	-0.4
15. How often is this child aggressive with peers or siblings? (7 = almost all the time)	4.0 (range = 1-6)	2.6 (range = 2-4)	-1.4

Table

Question	Mean 1st Year Follow-Up (N=5)	Mean 2nd Year Follow-Up (N=5)	Difference Increase (+) or Decrease (-) from 1st Year
16. How often does this child play with materials and toys appropriately? (7 = always)	5.2 (range = 3-7)	5.4 (range = 4-7)	+0.2
17. Compared to children of the same age, how long is this child's attention span? (7 = very long)	4.0 (range = 2-6)	4.1 (range = 2-7)	+0.1
Academic Skills How does this child compare to her/his peers in the following conceptual/academic skills?			
18. Counting/math (7 = far above age level)	4.6 (range = 2-7)	4.8 (range = 4-7)	+0.2
19. Pre-reading skills (7 = far above age level)	4.5 (range = 2-6)	4.5 (range = 3.5-6)	Same
20. Fine motor/writing (7 = far above age level)	4.6 (range = 2-7)	4.8 (range = 4-7)	+0.2
21. Overall skills (7 = far above age level)	4.0 (range = 2-6)	4.2 (range = 3-6)	+0.2
How does this child compare to her/his peers in the following behaviors?			
22. Aggression to peers (7 = highly aggressive)	4.4 (range = 1-7)	2.8 (range = 2-4)	-1.6
23. Distractability (7 = highly distractible)	4.6 (range = 2-7)	4.6 (range = 4-7)	Same
24. Independent working skills (7 = consistently interacts)	3.4 (range = 1-6)	4.2 (range = 3-7)	+0.8
25. Destructive with materials (7 = never uses materials inappropriately)	5.2 (range = 2-7)	5.2 (range = 4-7)	Same
26. Disruptive to classroom routine (7 = never disrupts classroom)	4.6 (range = 1-7)	6.0 (range = 4-7)	+1.4